NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia **23665-5225**

For Release:

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RELEASE NO. 90-13

February 23, 1990

NASA LANGLEY ESTABLISHES EXPLORATION OFFICE; PRITCHARD NAMED HEAD

NASA is aggressively moving forward in the area of human exploration of space and Langley is preparing to be a part of that initiative. To that end, Langley Research Center has established the Human Exploration Initiative Office (HEIO), reporting directly to the Director for Space. E. Brian Pritchard has been appointed to head the HEIO.

Pritchard will spearhead the effort to vitally involve Langley in the Nation's program for human exploration of the solar system. HEIO will be responsible for recommending and advocating the Center's role in this important Agency effort. In his new position, Pritchard will lead mission and systems analyses to define technology needs and development options.

Pritchard views his role as "the development of the strategic plan as well as the business plan to involve Langley in a major way in the human exploration initiative." He believes that Langley will be involved not only in technology development but also in a more visible, developmental role. Just what Langley's role will be and what facilities and personnel will support it are the immediate concerns of the new office

"Personally, I'm very excited about the opportunity," said Pritchard. "I've been working planetary missions, off and on, throughout my entire career." Having been involved in the Viking initiative, Pritchard is very optimistic about a return to Mars. More recently, he has been actively involved in the NASA Headquarters' Office of Exploration, looking at

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requirements for transportation nodes.

Pritchard was formerly deputy manager of the Space Station Freedom Office at Langley. His responsibilities included definition of space station systems and the capabilities required to meet future requirements and assessment of the needs and benefits of advanced technologies for the evolutionary space station.

He began his NASA career in 1959 as an aerospace technologist. In 1966, he became head, Missions Section, Aero-Physics Division. From April to October 1970, he served as head, Mission Analysis Branch; from October 1970 to August 1972, he was head, Mission Analysis and Applications Branch. The following year, he was named head, Analysis and Advanced Concepts Branch. In August 1973, he was selected assistant chief, Space Applications and Technology Division and, in February 1975, he was named chief of that office. From May 1982 to May 1983, he was detailed to the NASA Space Station Task Force at NASA Headquarters in Washington, D.C., where he directed the space station needs, attributes, and architectural options studies, including development of space station mission requirements.

Pritchard is a native of Wilson, N.C. An honor graduate of Granby High School, Norfolk, he studied aeronautical engineering at the Norfolk division of William and Mary and Virginia Polytechnic Institute. In 1957, he received a bachelor of science degree and, in 1959, a master of science degree in aeronautical engineering from VPI.

The recipient of numerous honors and awards, Pritchard has been awarded the NASA Medal for Special Achievement. He is the author of over 50 publications and holds a patent on "Orbital and Entry Tracking Accessory for Globes."

He is past chairman of the Hampton Roads Chapter of the American Institute of Aeronautics and Astronautics and past president of the Driver Ruritan Club. He is a former member of the Suffolk Airport Commission and a member of the Suffolk Planning Commission.

He and his wife, Esther, and their daughter, Laura, live in Suffolk.

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March 8, 1990

INTERNATIONAL CONFERENCE TO ADDRESS BURNING ISSUE

Where there's smoke, there's fire! "When the smoke dissipates, however, the climatically dangerous greenhouse gases produced by burning of forests, grasslands and vegetation are just beginning their negative impact on our atmosphere," says Langley Research Center senior research scientist Dr. Joel S. Levine.

Levine is convenor of a Chapman Conference on Global Biomass Burning, the first ever on this important subject. The international conference, March 19-23 in Williamsburg, Va., is sponsored by the American Geophysical Union, Washington, D.C.; NASA Headquarters, Washington; and the NASA Langley Research Center, Hampton, Va. Also supporting the meeting are the National Science Foundation, the Environmental Protection Agency, the U.S. Forest Service, the International Geosphere/Biosphere Global Change Project and the International Global Atmospheric Chemistry Project.

The conference will bring together leading scientists and environmental policy planners from over 25 countries, including China, the Soviet Union, Western Europe, Brazil, Africa, India, Australia and Canada. Conference attendees will attempt to quantify how much of the Earth's surface burns each year as well as the amount of harmful gases that are produced. Further, participants will consider the impact these gases have on the composition and chemistry of the atmosphere, on the climate of our planet and on the Earth's biosphere itself.

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"Over the past few years biomass burning has been identified as a major source of three of the most important greenhouse gases in the atmosphere--carbon dioxide, methane and nitrous oxide," states Levine. Biomass burning includes such activities as deforestation in the Amazon rainforests, burning of savannah grasses in Africa, South America, Indonesia, New Zealand and Australia and the burning of agricultural stubble worldwide. This combined burning may produce 25-40 percent of the carbon dioxide produced by the world's burning of fossil fuels each year, and more than 25 percent of the world's methane and nitrous oxide production. Biomass burning is also a very significant source of atmospheric carbon monoxide and nitric oxide, which lead to the formation of ozone near the ground. Ground level ozone is a pollutant and an irritant, and harmful to all living things--plants, animals and humans.

Immediately impacting both climate and atmospheric chemistry, biomass burning also greatly enhances biogenic emission of methane and nitrous and nitric oxides from the surface for time periods ranging from weeks to months following a fire. In addition to an enhanced production of soil ammonium, biomass burning affects the rate of soil erosion, water run-off and, in tropical rainforests, the extinction of numerous species of plants and animals.

Global burning is much more widespread than previously believed. Estimates suggest that as much as five percent of our planet's land area is burned each year. In the tropical forests of the Brazilian Amazon for instance, burning destroys about 28 million acres a year or about 50 acres every minute of every day. At this rate of loss by fire, every acre of tropical forest on Earth will be destroyed within the next 100 years.

"We believe that more than 95 percent of global burning is human initiated and can be stopped once the world's leaders are aware of its detrimental environmental consequences," Levine continues. "This is one area of science where we can affect a reversal of a dangerous trend by raising awareness and public education. This is one of the goals of the Williamsburg conference."

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In an uncharacteristic move for scientific gatherings, the conference will strive to educate those directly affected by global burning by opening sessions to the general public. Evening sessions at 8 p.m. on Monday and Wednesday will be delivered by leading scientists on pertinent issues. These sessions will be free and open to the public. Following the evening sessions, attendees will have the opportunity to interact with the scientists.

Serving a larger audience, a live teleconference will be aired Friday, March 23, from 2 to 3:30 p.m. over the Public Broadcasting Service (PBS) network and the Westar IV satellite. Joel Levine will moderate three panels of selected conference scientists who will address the scientific impact and consequences of global burning; the political, economic and social implications of burning; and public education/public awareness of environmental issues.

An 800 toll-free telephone number will enable viewers to ask questions of leading scientists in each of these three areas who will participate in the panel presentations. This teleconference is being planned by the Langley Research Center, the PBS network; WHRO-TV, the local PBS affiliate and the Virginia Department of Education.

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Note to Editors: News media wishing to participate in the Williamsburg Conference may call Marny Skora, (804) 864-6126.

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RELEASE NO. 90-26

March 8, 1990

PUBLIC INVITED TO QUESTION ENVIRONMENTAL EXPERTS

Leading scientists and environmental policy planners from 25 countries will gather in Williamsburg, Va., for the first international conference on Global Biomass Burning, March 19 23. In addition to sharing information within the scientific community, a main goal of the conference is to raise public awareness and initiate public education on this important isssue, a driver for global change.

On Monday and Wednesday at 8 p.m. sessions delivered by two of the leading scientists in the field will be open, free of charge, to the general public. On Friday, at 2 p.m., a live teleconference addressing three burning issues will be aired over the Public Broadcasting Service (PBS). The conference is sponsored by the NASA Langley Research Center, Hampton, Va., NASA Headquarters and the American Geophysical Union, Washington, D.C.

Dr. Thomas E. Lovejoy, assistant secretary for External Affairs, The Smithsonian Institution, will speak on "The Vanishing Rainforest" on Monday evening, March 19. Lovejoy was recently appointed by President Bush to his Science Advisory Panel.

On Wednesday, March 21, Dr. Stephen Pyne, Arizona State University professor, will speak on "Fire in North America: A Historical Perspective." Pyne is a MacArthur Fellowship winner and a leading authority on fire in the United States.

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"We believe that more than 95 percent of global burning is human initiated and can be stopped once the world's populations are aware of its detrimental environmental consequences," says Dr. Joel S. Levine, senior research scientist at NASA's Langley Research Center and organizer of the conference. "This is one area of science where we can affect a reversal of a dangerous trend by raising awareness and offering public education."

Evening sessions will be held in the conference center auditorium of the Williamsburg Hilton, 50 Kingsmill Road, at 8 p.m. Admission is free of charge and seating will be on a first come-first served basis.

Serving a much larger audience, a live teleconference featuring renowned atmospheric scientists will be aired Friday, March 23, from 2 to 3:30 p.m. over the PBS network and the Westar IV satellite.

Levine, former Virginia Scientist of the Year, will moderate three panel discussions. Selected experts will address the scientific impact and consequences of global burning; the political, economic and social implications of burning; and public education/public awareness of environmental issues.

A question-and-answer session will follow each of the three panel discussions. An audience of 100 Virginia science and technology educators have been invited to witness the televised session and interact with the scientists. Viewers from all over the world may also question the experts by dialing a toll-free 800 telephone number which will be announced at the beginning of the teleconference.

The live teleconference is a cooperative effort of the NASA Langley Research Center, PBS, WHRO-TV, and the Virginia Department of Education.

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NASA News

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RELEASE NO. 90-27 March 9, 1990

NASA LANGLEY TO SUPPORT NEW STATE FOCUS ON SPACE BUSINESS

Developing economic opportunities in space is the focus of a major Commonwealth of Virginia initiative in which the NASA Langley Research Center will support a prominent cross-section of scientific, business, education and public agencies.

The newly formed Virginia Space Business Roundtable is seen as the catalyst for a partnership dedicated to the growth of a vigorous space industry and world-wide market for Virginia space technology, according to Frederick O. Allamby, Langley's manager of Commercial Programs and a charter member of the roundtable's board of trustees. Serving as the group's president is Dr. Dennis W. Barnes, the Governor's Space Business Advocate and associate vice president of Governmental Affairs at the University of Virginia. Barnes and NASA Langley already have a mutually supportive relationship as he chairs the advisory group of the Virginia Grant Consortium whose thrust is to capitalize on NASA services and programs as the cornerston new emphasis on aerospace education at all levels.

The Virginia Roundtable was chartered by the Space Foundation, a Houston organization that promotes commercial space development. There are seven other roundtables in the country. The Virginia group will sponsor speeches by state and federal space policy specialists, offer

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training in applying existing space technology to commercial products and invite government decision-makers and business leaders to workshops where they will develop stategies to boost the state's space industry. Additionally, meetings will be arranged for aerospace executives, university officials and NASA personnel to help identify new business opportunities for the state within the space program.

Early efforts include scheduling a series of day-long technology transfer seminars led by the editor of **NASA TechBriefs** magazine. A roundtable workshop in Richmond on the use of satellite remote sensing data by Virginia state agencies is planned for later this year. The group is hoping for membership from all sectors of the state, with growth to 100 members by the end of 1990. The parent Space Foundation has been exploring the potential of expanding internationally with roundtables in Moscow, Japan and Australia.

The first formal board meeting was held March 8 at Norfolk's Omni Hotel when Courtney Stadd, newly appointed senior director for commercial space with the President's National Space Council, made the keynote speech. According to Joel Levy, chairman of the board of trustees, the Norfolk location emphasizes the roundtable's intent to draw on the southern Norfolk/Richmond/Hampton region of Virginia to complement the heavy northern Virginia participation in the Washington-based roundtable. Overall, says Levy, the Virginia Roundtable is designed to promote an understanding of how viable the commercialization of space can be for non-aerospace companies.

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RELEASE NO. 90-31 March 19, 1990

NASA SCIENTIST MAPS GLOBAL POLLUTION WITH NEW SATELLITE TECHNIQUES

The spread of low altitude pollution throughout the world will get new visibility as the result of a NASA Langley scientist's application of satellite mapping techniques.

Using, for the first time, the combined surveillance power of two different satellite systems, Dr. Jack Fishman of Langley's Atmospheric Sciences Division, has mapped the global distribution of potentially poisonous ozone in the troposphere--the lowest part of the Earth's atmosphere. In the process, his research has revealed important new facts about the causes of an alarming increase in pollution of the air breathed by the world's population.

Fishman's mapping of tropospheric ozone concentrations reveals major pollution plumes coming from the populated continents. Of particular significance, says Fishman, was identifying the "African Hotspot," a previously uncharted source of pollution from biomass burning of savanna and forestland in western and central Africa.

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Most of the African activity is the result of farmers and tribesmen setting fires to clear shrubs and to stimulate the growth of crops and grass. This effort involves thousands of acres and fires often rage for months at a time. Unfortunately, the cumulative effect is to create ever larger expanses of grassland which are, in-turn, burned regularly. The problem is further intensified by steady population growth in these tropic areas with corresponding increases in cultivation. The overall process has made Africa the world's leading source of pollution from the burning of vegetation, according to Dr. Paul Crutzen of the Max Planck Institute for Chemistry in Mainz, West Germany, where Fishman once served as a visiting research professor. In a New York Times News Service article, Crutzen reported that the African fires dump three times more gases and particles into the low atmosphere than from all the fires in South America.

To study this pollution, Fishman has developed a satellite measurement technique which shows the points of origin and subsequent migration patterns of such "smog." Scientists can now see how locations far away from primary pollution sources can suffer the effects of the contamination. His research confirms the ability to definitively measure the presence of low-level ozone using two instruments that were originally designed to measure ozone in a different region of the atmosphere: TOMS (Total Ozone Mapping Spectrometer) aboard the Nimbus 7 satellite and SAGE (Stratospheric Aerosol and Gas Experiment) which was on the Applications Explorer Mission-2 satellite in 1979 and was again deployed by the Space Shuttle in 1984. TOMS was developed at NASA's Goddard Space Flight Center in Maryland and SAGE at Langley by a team led by Dr. M. Patrick McCormick, also of Langley's Atmospheric Sciences Division.

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Tropospheric ozone is the product of chemical reactions between nonmethane hydrocarbons, nitrogen oxide and sunlight. Auto exhaust, biomass burning and industrial emissions are the world's greatest sources of these pollutants. This ozone is distinguished from the ozone in the upper reaches of the Earth's atmosphere, or stratosphere, which serves as a shield against solar radiation and is generated through a different chemical process.

Low level ozone concentrations have been increasing at an average rate of one to two percent per year in the Northern Hemisphere since the 1970s. Fishman says this increase is three to five times the rate of carbon dioxide build-up, which has long been viewed as one of the major areas of concern by scientists investigating the theoretical phenomena of "Global Change." He points out that ozone has reached levels that can be detrimental to humans even in rural areas, which is a significant change from earlier years when only a few urban centers, like Los Angeles would occasionally reach harmful levels. The toxic effects of ozone are further seen in the recent heavy crop losses of U.S. farmers, the dying forests in Germany and the damage to U.S. forests at higher elevations, Fishman adds.

However, he notes that examples like his satellite identification of ozone concentrations are beginning to focus overdue attention on the problem as one of global proportions. For instance, the International Global Atmospheric Chemistry Programme has recently been established to investigate the global pollution problem, including specific field programs that will concentrate on tropospheric ozone generation resulting from biomass burning. This latest satellite research is a major extension of the work NASA has been doing in tropospheric ozone

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distribution analysis using the Agency's Electra aircraft as well as rocket and balloon technology. Now, through the efforts of scientists such as Fishman, NASA is playing an increasingly influential role in this international thrust to focus new techniques on this problem.

The scientific verification of Fishman's satellite mapping process is the subject of his paper which will appear in the March 20th issue of the **Journal of Geophysical Research**, one of the leading technical journals which concentrates on studies of the Earth's atmosphere. Entitled "Distribution of Tropospheric Ozone Determined From Satellite Data," it details the methods used and demonstrates that the results achieved can be verified by previously established measurement techniques at various locations throughout the world. The paper, which highlights the findings of research funded by NASA's Global Tropospheric Chemistry Program since 1984, was co-authored by Catherine E. Watson, Lockheed Engineering and Science Corporation; Jack C. Larsen, STX Corporation; and Jennifer A. Logan, Harvard University.

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RELEASE NO. 90-32 March 26, 1990

NASA ENGINEERS AID LAND SAILOR IN QUEST FOR WORLD CHAMPIONSHIP

NASA's long-standing reputation for aerodynamic design innovation is being demonstrated in a new and unusual way as Langley Research Center engineers work with an Oregon inventor to perfect land yacht sail technology for international racing competition.

Land yachts are wheeled sailcraft capable of speeds over 90 m.p.h. on the open expanses of desert or dry lake areas of the world where they compete. This year's premier event will be the World Cup Regatta which will feature a full complement of international competitors to challenge American racers at Ivanpaugh Dry Lake, 40 miles west of Las Vegas, April 8-13.

Most of the yachts use modified sailboat technology with cloth sail materials. However, a few builders here and abroad are experimenting with rigid airfoil-type structures shaped like an airplane wing mounted vertically. This is the same general approach used by the American sailing catamaran *Stars and Stripes* to defeat the New Zealand monohull boat in last year's challenge race off San Diego, California.

In adapting this emerging technology to such an unusual application, Philip M. Rothrock, former math teacher from Portland, Oregon, together with his engineer father Art began by using previously published NASA data for aircraft wing configurations. Their focus was on high

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lift, low velocity designs from early NACA work done at Langley. Using this approach, coupled with wing flap experimental data also produced by the Hampton, Virginia research facility, the Rothrocks won major land yacht races in 1987 and 1989, and have been seeking design refinements ever since.

In the course of that pursuit, they have sought the help of NASA Langley engineers. This racer-consultant relationship has produced continuing design evolution of aircraft wing and flap adaptation to the land yacht as the Rothrocks prepared for major challenges from land sailors around the world. This work involved Langley's Harry L. Morgan, Jr., an aerospace engineer in the Subsonic Aerodynamics Branch of the Applied Aerodynamics Division. Morgan offered suggestions for airfoils which would produce higher lift-drag ratios and maximum lift coefficients than some of the NACA designs. He also proposed changing the Rothrock approach to flap applications--used by the land yacht to gain starting momentum and also to adjust for wind speed variations. Morgan's idea was to incorporate recent Langley research on new aircraft flap systems which employ trailing-edge deflection for small adjustments in the lift coefficient in climb and cruise conditions. This departure from what the Rothrocks were using is thought to better match what the flaps do for an airplane to the specific demands of the land yacht in its acceleration and sustained speed racing modes.

The next test of the effectiveness of these refinements will occur when the Rothrocks and their fellow Americans are confronted by land yachts from England, Germany, Australia, New Zealand, France and other countries at the World Cup Regatta during the April competition.

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NASA News

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March 13, 1990

RELEASE 90-40

HIGH-SPEED TRANSPORT ACCEPTANCE LINKED TO TECHNOLOGY ADVANCEMENTS

Results from the first two years of high-speed civil transport studies suggest that technological advances will determine the environmental compatibility, marketability and public acceptance of a next-generation supersonic commercial airliner.

Boeing Commercial Airplanes, Seattle, and Douglas Aircraft Co., Long Beach, Calif., recently published reports covering the first phase of studies commissioned by NASA. Based on projections for significant increases in transoceanic air travel, both companies concluded that there will be a market for commercial transports flying at two to three times the speed of sound (1350-2000 mph) between the years 2000 and 2015. According to the studies, transpacific air travel should increase four-fold by the year 2000, while transatlantic passenger trips are expected to double.

Trip times aboard a high-speed civil transport would shrink dramatically compared to flights on today's wide-bodied subsonic airliners. A trip from Los Angeles to Tokyo, for example, would be reduced from just over 10 hours to a little over 4 hours. A next-generation supersonic airliner could carry up to three times the passenger load of the current Anglo-

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French Concorde at less than one-seventh the cost per passenger mile and with about twice the Concorde's range.

The Boeing and Douglas studies determined that substantial demand for an advanced supersonic transport will materialize only if the aircraft meets allowable standards of airport noise, has no harmful effects on the atmosphere and is economically competitive with future long-haul subsonic airliners. The plane's economic practicality would be enhanced if it meets acceptable overland sonic boom noise levels.

The reports pointed out that technology to build a high-speed civil transport satisfying these requirements is not yet available. They identified significant advances that should be possible by the early 21st Century, however, such as variable-cycle engines, newer composite and metallic materials combined with new structural designs, supersonic laminar air flow and fully integrated flight and engine controls. These technology developments would permit supersonic airliners to be more efficient, in turn allowing supersonic fares to compete with subsonic fares.

Each company focused on a different class of aircraft. Douglas studied a Mach 3.2 (approx. 2,150 mph) design sized to carry approximately 300 passengers a distance of 7,500 statute miles. Boeing's Mach 2.4 (approx. 1,600 mph) concept, which could be developed more quickly, was sized to carry 250 passengers a distance of 5,800 statute miles.

Boeing considered an aircraft certification date of 2000, and assumed a 65 percent passenger load factor and a 50 percent flight-time savings. Using these standards, the company concluded that a Mach 2.4 transport could capture more than 50 percent of the long-haulinternational aircraft market, or as many as 750 supersonic airliners.

The same analysis indicates that a high-speed civil transport using current technology would snare only about one-third that amount of business, making capital investment far riskier. Furthermore, if two manufacturers competed for a share of today's supersonic market, economic viability would be even more reduced.

The study results have encouraged NASA, Boeing and Douglas to conduct additional research on a second-generation supersonic airliner. In late 1989, NASA initiated the government-industry High Speed Research program to tackle the technical and economic challenges of making a high-speed civil transport an "environmental good neighbor." The effort will continue through the mid-1990's.

NASA officials caution that the High-Speed Research program does not imply commitment to a supersonic civil transport aircraft. If the program shows sufficient promise and further studies confirm that such an aircraft is environmentally sound as well as important to the transportation system and the national economy, a cooperative NASA-industry focused vehicle technology development effort could be considered as a next step. Ultimately, the decision to develop and produce a high-speed civil transport will rest with the nation's aerospace industry.

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NOTE: Photos are available to illustrate this release by calling 202/453-8375.

	Color	B&W
Boeing artist's concept	90-HC-138	90-H-146
Douglas artist's concept	90-HC-139	90-H-147

NASA News

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RELEASE NO. 90-41 April 18, 1990

SAFETY GROOVING NAMED TO TECHNOLOGY HALL OF FAME

A NASA Langley Research Center project that eliminates hydroplaning and permits aircraft to decelerate in a shorter runway distance has been selected for inauguration into the Space Technology Hall of Fame.

Safety grooving drains surface water from runways, enhances aircraft braking and improves directional control. Thomas J. Yager, Landing and Impact Dynamics Branch, and Langley retiree Walter B. Horne accepted the award for their work on safety grooving at the U. S. Space Foundation's Sixth National Space Symposium held April 9-11 in Colorado Springs, Colorado.

Accidents on slippery highways are down as much as 85 percent. Injuries caused by wet surfaces on swimming pool decks, playgrounds and work areas in refineries, factories and meat-packing plants have been reduced. Both are due to "spinoffs" of safety grooving. As a result of this NASA research, hundreds of commercial airports around the world have been safety-grooved and every state in the U.S. now has grooved some of its highways. The safety grooving process has also been applied to interstate highway curves and overpasses; pedestrian walkways, ramps and steps; food-processing plants; and cattle holding pens.

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The technology has been shown to restore pavement surfaces and extend their service lifetime by five to 10 years, thus saving enormous maintenance costs. These benefits have "spun off" from aerospace research conducted at NASA Langley in the 1960s.

Aircraft land at speed ranging from 60 mph for small craft to 190 mph for a Boeing 747. After touchdown, a speeding aircraft must reduce lift, settle full weight to the pavement and decelerate rapidly to a safe turnoff speed before reaching the end of the runway. This deceleration requires good traction between aircraft tires and runway pavement.

Tests conducted under controlled conditions at Langley's Landing Loads Facility in the late fifties provided an understanding of the many factors which influence degraded aircraft braking and directional control performance on wet runway surfaces. The phenomenon of tire hydroplaning was identified and the associated losses in tire traction were defined for a variety of test parameters. These investigations indicated that they key to minimizing tire hydroplaning was to alleviate the fluid pressure build-up between the tire and the pavement. Langley researchers developed a method of cutting thin grooves across concrete runways, thus creating channels through which excess water is forced, thereby reducing the risk of tire hydroplaning.

In 1962, pavement grooving studies were begun at the track facility to evaluate environmental effects, grooving techniques and tire friction and wear performance on many different test pavements. On the basis of the Langley test track results, an optimum transverse groove arrangement was selected for installation on a specially constructed runway at Wallops Flight Facility. Grooves were cut into the runway surface 1/4-inch wide, 1/4-inch deep on one-inch centers.

In 1968, with the assistance and support of the U. S. Air Force and the Federal Aviation Administration (FAA), full-scale, instrumented aircraft tests to evaluate the effect of pavement grooving on aircraft braking performance was initiated at Wallops. Promising results from -

these tests encouraged installation of grooved pavement on a few airport runways as well as on selected highway curves.

In a joint program with the USAF and the FAA from 1969 to 1972, a C-141, a B-727 and a DC-9 aircraft were instrumented at Langley to conduct braking performance tests on over 50 different grooved and ungrooved runway surfaces. Results from these tests clearly indicated the benefits of grooving to improve wet tire traction. This relatively small NASA investment to develop and evaluate pavement grooving has initiated action on our nation's runways and highways that has significantly minimized wet pavement skidding accidents and improved the safety of aircraft and ground vehicle operations during wet weather. This Space Technology Hall of Fame spinoff has also been used to modify the Space Shuttle landing strip at the Kennedy Space Center.

The Space Technology Hall of Fame was established by the U. S. Space Foundation in conjunction with NASA's Technology Utilization Division, Office of Commercial Programs, to create broader awareness of the many spinoffs from technology originally developed by NASA for the space program. The Hall of Fame, located in Colorado Springs, inducted the first group of spinoff technologies in April 1988.

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NOTE TO EDITORS: Photographs are available to illustrate this news release.

Color photos: Awardees Yager and Horne inspect grooved concrete runway test surface at NASA Wallops Flight Facility.

Surface of Space Shuttle landing strip at the Kennedy Space Center, Fla., is safety gooved.

NASA News

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RELEASE NO. 90-47 May 4, 1990

NASA TECHNOLOGY TRANSFER AIDS BURN VICTIM TREATMENT

Sound waves, used to detect microscopic flaws in materials destined for use in spacecraft, have been refocused by NASA scientists on human burn victims to speed diagnosis and treatment.

The new application capitalizes on nondestructive, ultrasound techniques developed to assess quality, fatigue and age of the variety of materials and products NASA uses in its space and aeronautical ventures. Two Langley research physicists, Dr. John H. Cantrell and Dr. W. T. Yost of the Nondestructive Measurement Science Branch, have spearheaded this technology transfer which signals a new level of insight for the difficult problems of burn diagnosis.

The crucial problem in burn diagnosis, says Cantrell, is to know how deep the damage goes. This is especially true in second and third degree burns when the outer layer of skin, the epidermis, is burned through into the underlying dermis (second degree) or entirely penetrates that layer so that no skin is left (third degree). Since the depth of the burn relates directly to

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the treatment required, including the need for prompt skin grafts or life threat determination, a precise way to gauge the burn's penetration is essential to successful treatment and recovery, he added.

Until recently that process was entirely subjective because physicians had no way to "see" the actual condition beneath the damaged area and their wound assessments were thus only correct half the time, according to David M. Heimbach, M. D., writing in the September 1984 issue of *The Journal of Trauma*. "That is why the untraumatic nature of our work with ultrasonic technology, which is designed to penetrate and measure the microstructural properties of materials, lends itself so very well to a human health initiative involving the skin," Cantrell stated.

The technology Cantrell and Yost employ in their normal course of work involves the basic application of ultrasonic waves--very high frequency sound waves--which, when emitted into a material, are partially reflected from abrupt changes in the material. These echos identify the location, for example, of cracks and delaminations that might occur in aerospace materials.

The spinoff to burn depth assessment applies those same principles of ultrasonic waves to a burn. These physicists have found that the burn forms an interface between burned and healthy skin tissue. The echos from this interface can then be translated to depth measurements by a trained operator for the attending physician. Such capability provides a major new tool in the planning of overall care for burn patients, Yost stated.

The research for this project was conducted under NASA's Technology Utilization Office (TUO) and also involved clinical testing at The Medical College of Virginia in Richmond where Dr. Anthony Marmarou, assistant head of the Department of Neurosurgery, and Dr. B. D. Haynes, chief of the Burns Unit, played prominent parts in validating the proprietary

technique. Another participant is the firm of Jack Cantwell, Incorporated, which is NASA's commercial partner and exclusive licensee in marketing the invention. This relationship is mandated by the TUO as part of the funding structure for government supported technology transfers, according to Harold Adams, patent attorney in Langley's Office of Chief Counsel.

Cantrell and Yost will each be presented an Award for Excellence in Technology Transfer by the Federal Laboratory Consortium in ceremonies to be conducted May 9 in Denver. The awards are the highest honor given by that agency for technological transfer projects and the competition is very keen among all federal laboratories in the country, says John Samos, Langley's Technology Utilization Officer. In the last five years Langley has had three other winners.

Cantrell came to Langley in 1977 from the Oak Ridge National Laboratory where he was a consulting physicist. He holds a bachelor of science in physics, with honors, from the University of Tennessee where he also earned his doctorate in physics in 1976. His specialties with NASA are physical acoustics and ultrasonics, solid state physics and nonlinear thermoelasticity. Cantrell, his wife Davie and son Sean live in Tabb, Virginia.

Yost left his post as a Professor of Physics at Emory & Henry College, Emory, Virginia, in 1982 to join NASA. His 1961 bachelor of science degree in physics was from that school. Both his masters and doctorate degrees in physics were from the University of Tennessee in 1964 and 1972. Yost specializes in nonlinear effects in physical acoustics. He and his wife Barbara Ann live in Newport News, Virginia. They have two daughters.

-end-

NASA News

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RELEASE NO. 90-58 June 25, 1990

NASA LANGLEY RESEARCHERS INTENSIFY LDEF POST-FLIGHT ANALYSIS

The principal research investigators for the Langley-originated experiments on the Long Duration Exposure Facility (LDEF) are well into their examination of what the onboard sensors, materials and detectors are revealing about the six-year space sojurn.

LDEF carried a total of 57 experiments involving scientists and engineers worldwide. Langley has principal and co-investigators for seven experiments as well as overall project responsibility for the program and the management and coordination of all LDEF experiments.

The evaluation of Langley's experiments will, in many cases, take several years as each investigator postulates what the test results mean in terms of answers to basic science questions. These answers will relate to such projects as construction of Space Station Freedom, along with lunar and martian habitats, the National Aero-Space Plane and the ability to monitor the Earth's air pollution and conduct thermal mapping.

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The experiment managed by William M. Berrios of Langley's Spacecraft Systems Section is fundamental to all evaluations since it provides the temperatures encountered by LDEF. These data will be used by investigators to understand the thermal environment experienced by the LDEF experiments, a factor basic to successful analysis, according to Berrios. Temperature-sensing hardware was placed in seven different locations aboard the spacecraft to assess a variety of temperature variations including the center ring, average interior, maximum structural long-term and transient temperatures so that experimenters will be given an improved assessment of their experiments' thermal boundary conditions encountered during the mission. The information will also apply to developing new technology for the thermal control of future spacecraft.

Another investigator, Gale A. Harvey of the Chemistry and Dynamics Branch, is evaluating effects of space exposure on optical systems. Current and planned Earth resource and meteorological satellites and intersatellite communication links show a new level of sophistication being developed for future electro-optical systems. The LDEF results will be a major factor in that design and development evolution, says Harvey. Radiation detectors and selected optical components have been exposed to the space environment where hazards included radiation-induced discoloration, vibration and shock, erosion of coatings and optical contamination. The components were mounted in LDEF to simulate their likely surroundings in an operational system and for comparative analysis. Duplicate components have been maintained in the laboratory.

An investigation to examine conditions which will help determine the shielding requirements of future space hardware is the work being done by Donald H. Humes of the High Energy Science Branch. The objective is to establish the physical properties, population and size distribution of near-Earth meteoroids and the population of man-made debris in that same regime. Previous assessments have had only a narrow focus on mass with no overlapping measurements. This

experiment uses a uniform size detector--an aluminum plate--to detect material over a very large size range. The distribution of the craters caused by meteoroids will be used to determine their population and size. Similarly, the shape of the craters, the impacting particle material found on the crater walls and the location of the impacts on the spacecraft will be used to separate meteoroid strikes from those of man-made debris.

Further exploration of the make-up of space environs where future NASA activity will take place is being investigated by Philip C. Kassel, Jr. of the Photo-Optical Instrumentation Section. His study of interplanetary dust, also known as cosmic dust or meteoric dust particles, is designed to study particle mass and velocity and to undertake correlative analysis with other LDEF experiments. This pursuit has been historically plagued with low data rates and, therefore, statistically inadequate data analysis, he says. Now, for the first time, the flight of an experiment with a large effective area should provide statistical confidence. Metal-oxide-silicon capacitor-type impact sensors were placed in four locations around the periphery and at each end of LDEF. Since a major source of these micrometeoroid materials is comets, the experiment's results may also give important insight into the cometary phenomenon, Kassel adds.

Two experiments consider the space environment in terms of viability of spacecraft construction materials and coatings. Under the direction of Wayne S. Slemp, Applied Materials Branch, these efforts recognize that, as space systems become large and more complex and expensive, they will require much longer lifetimes in space to be economically feasible. The first evaluation is of the near-Earth orbital environment upon the physical and chemical properties of laminated, continuous-filament composites and composite resin films to be used in the construction of large space structures and advanced spacecraft. These materials offer unique advantages due to their superior strength, stiffness-to-weight ratios and lower susceptibility to thermal expansion, Slemp states. While ground laboratory testing

programs are in progress, they are impaired by lack of data on the effects of the space environment on the properties of these materials. The second, related experiment assesses the performance of thermal control coatings since degradation of these protective coatings from space radiation can cause spacecraft to overheat, leading to problems with sub-systems and mission lifetimes. The approach here is to compare the long-term space environmental effects with preflight measurements and ground-based laboratory effects.

The last experiment departs from the other efforts by investigating the effects of long duration space exposure and launch environment on the performance of infrared detectors used in monitoring air pollution and in thermal mapping of the Earth. These effects must be understood to ensure validity of air pollution and Earth mapping measurements, according to Dr. James B. Robertson of the Crew/Vehicle Interface Research Branch and principal investigator. The thrust of this experiment is to test pyroelectric detectors which are prime candidates to fill NASA's thermal detector requirements. They would replace current detectors which need large, complex and expensive cooling systems. The approach is to repeat preflight measurements for detector responsivity, detectivity, spectral response, pyroelectric coefficient and dielectric-loss tangent to determine the amount and type of damage suffered during launch and exposure.

These LDEF experiments and their Langley investigators will be featured further as test results are compiled and findings developed.

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NOTE TO EDITORS: A line art illustration which depicts the Long Duration Exposure Facility (LDEF) unrolled and flattened showing the experiment area is available from the Langley Public Affairs Office. Call (804) 864-6124.

NASA News

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For Release:

RELEASE NO. 90-71 July 23, 1990

UNITED STATES AND CANADIAN SCIENTISTS COOPERATE IN GLOBAL ATMOSPHERIC STUDY

Scientists from NASA and U.S. universities have joined Canadian researchers in an expedition to study pollution at high northern latitudes and emissions of methane, an important greenhouse gas, from tundra, forests and marshes.

Titled the Atmospheric Boundary Layer Experiment-3B (ABLE), the study will let scientists look at changes in chemical composition that occur when pristine Arctic air masses, which influence air quality and climate over North America, Eurasia and the northern oceans, mix with polluted continental air masses.

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Observations of Arctic atmospheric chemistry will be linked to studies by the Canadian Institute for Research in Atmospheric Chemistry (CIRAC) of the soil of lowland marshes near Hudson Bay. The soils under observation are a source of methane, which plays a critical role in atmospheric chemistry and possible global warming. Like carbon dioxide and the other "greenhouse" gases, methane traps heat near the surface of the Earth that otherwise would radiate into space, warming the atmosphere. Over several decades, higher temperatures could prompt other phenomena, such as the melting of light-reflecting sea-ice, that could lead to even more warming.

The CIRAC Northern Wetlands Project will study the sensitivity of methane emissions to changes in surface temperatures to predict how these emissions may change in a warmer climate. The main NASA sampling platform is the agency's Lockheed Electra aircraft, stationed at the NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Va. The Electra, a converted turboprop airliner, is scheduled to make 14 flights in the Hudson Bay lowland area and in Quebec. A Canadian DeHaviland Twin Otter aircraft will fly 50 research missions during the same period.

Ground sampling activity will involve towers and surface chambers at a McGill University facility in Schefferville, Quebec. Research activity began July 5 and will conclude Aug. 20, 1990. The air and ground measurements will be complemented by surface-vegetation data from the Landsat and French SPOT satellites.

The ABLE project is managed by Langley's Atmospheric Sciences Division for NASA's Office of Space Science and Applications. The program was established in the early 1980s to

study the chemistry of the Earth's atmosphere and its interaction with the land and the oceans. Other principal investigators are from NASA's Ames Research Center, Mountain View, Calif., and Stennis Space Center, Bay St. Louis, Miss., and from numerous U.S. and Canadian institutions.

- end -

ADDENDUM TO RELEASE NO. 90-71

LISTING OF OTHER ABLE/NWP PARTICIPANTS

United States

Georgia Institute of Technology

University of California--Irvine

University of New Hampshire

Harvard University

State University of New York--Albany

University of Delaware

University of North Carolina

Woods Hole Oceanographic Institution

University of Maine

ST Systems Corporation

Canada

Atmospheric Environment Service

National Water Research Institute

York University

National Aeronautic Establishment

McGill University Subarctic Research Station

LOCATIONS/DATES OF WORK

Ground-based measurements in Schefferville	July 10 thru Aug. 20
Electra flights in Hudson Bay lowland area and in Quebec	July 9 thru Aug. 8
DeHaviland Twin Otter flights in Hudson Bay lowland area	July 5 thru Aug. 8
Landsat and French SPOT imagery of surface vegetation	July 5 thru Aug. 20

INTERVIEWS

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RELEASE NO. 90-99 September 26, 1990

REVOLUTIONARY COMPOSITE MONITORING DEVICE RECEIVES R&D 100 AWARD

A recently patented monitoring system that will advance NASA's goal to exploit the full potential of composite materials, is the winner of a 1990 R&D 100 award. The In-Situ Fiber Optic Polymer Reaction Monitor, developed by Foster-Miller Inc. and Langley Research Center in Hampton, Virginia, was selected by **Research and Development** magazine as one of the 100 most significant technological advancements of the year.

This innovation represents a quantum advance in the processing of polymer matrix composites like carbon fiber and high performance resins. Conceived at Langley, the new technology should find numerous research and commercial applications ranging from the manufacture of new aerospace materials to environmental and industrial arenas, said Dr. Philip Young, a principal developer of the system and senior polymer scientist in Langley's Polymeric Materials Branch.

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The analytical system is capable of directly measuring the chemistry of a variety of advanced composite materials through the use of fiber optics, the transmission of light through fiber. Fiber optics can sense infrared spectra, light lying outside the visible spectrum, which fingerprint the integrity of a composite.

This monitoring technique may alleviate problems associated with the manufacture of advanced carbon fiber composite materials by recognizing the need to redistribute temperature and pressure during the cure process. The monitoring of pure resin chemistry helps to yield optimum materials, since voids or imperfections that can be attributed to a decrease in performance can be compensated for during processing, said Young. Monitoring may take place in virtually any environment, during or after manufacture.

"The capability to directly observe, interpret and control the formation of composite matrix building blocks, the chemical bonds between atoms, is revolutionary. Significantly higher yields in the manufacture of complex composite parts for aircraft structural elements and substantial cost reductions could result," said Young. "This monitoring device may speed the general acceptance of composites, which are considered to be important materials of the future." This prospect drives Langley's interest in the technique.

Many other potential applications exist for a sensor that is universal to all organic materials and most inorganic gases. These include monitoring the integrity of composites in the in-service environment, the remote sensing of hazardous materials such as in smokestacks, and the examination of industrial processes in reactors and furnaces.

Substantial research and development have been expended to improve the quality and reliability in this class of materials. "This technology may be directly applied to materials and used in future spacecraft and commercial transport structures," said Young. "Today composite materials are used in the 757, 767, and other advanced aircraft."

Foster Miller, Inc., a business under contract to NASA through the Small Business Innovative Research Program, was granted a U.S. patent covering this analytical system. The development was primarily done at Foster Miller while Langley is responsible for the majority of the monitoring and technical suggestions, said Young. "The device is primarily a research and development tool aimed at composite manufacturers that are developing aircraft. With proper development and funding, numerous unique applications are feasible."

Langley Research Center has earned 19 R&D 100 awards in its 23 years of competition. NASA ranks second on the list of R&D 100 award recipients.

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For Release:

RELEASE NO. 90-100

September 26, 1990

NASA'S LASER VELOCIMETER DEVICE RECEIVES R&D 100 AWARD

A method of processing data on the velocity of fluid flow has been awarded a 1990 R&D 100 award, recognizing it as one of the 100 most significant new technical products this year.

James F. Meyers, an aero-space technologist, and James I. Clemmons, Jr., a senior electronics technician at NASA's Langley Research Center in Hampton, Virginia, developed the technology that led to the fabrication of the Frequency Domain Processor (FDP 3100). The device can accurately measure air flow, blood flow, water flow and crystal growth, depending on the computer software used.

Meyers and Clemmons, of Langley's Gas Parameters Measurement section, were assisted by John W. Stoughton, Sharad V. Kanetkar and Andreas E. Savakis, from Old Dominion University in Norfolk, Virginia.

The R&D 100 award is presented annually by *Research and Development* magazine to organizations that developed the 100 most significant products for advancing science and technology during the year. Selections are made by a panel of scientists and engineers after

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studying new technology around the world.

The FDP 3100, coupled with a laser based optical system, measures the velocity of air in wind tunnels, for example. However, air cannot be measured directly, so the velocity of very small particles in the air is measured. The FDP 3100 digitizes the signal created by the laser based optical system hitting the very small particles to determine the velocity. The concept behind the FDP 3100 is not new, but the implementation and electronics supporting it are.

The advantages of the FDP 3100 include its ability to use more points of data to receive more accurate results than previously existing products, allowing the great accuracy scientific applications require. The most important industrial spinoff is that the FDP 3100 does not require a highly experienced user; by allowing a user with a lower level of experience, the FDP 3100 is more cost effective as a technician does not need a great deal of specialized training. Among others, Ball Manufacturing and Anheuser-Busch Brewing Company are interested in the FDP 3100 to measure the thickness of aluminum sheet rolls, and they estimate they can save $100,000 each month at each plant as a result.

Macrodyne, Inc., a company participating under the NASA Small Business Innovative Research (SBIR) Program fabricated the FDP 3100 and obtained a license from NASA to manufacture and market the FDP 3100.

Langley Research Center has earned 19 R&D 100 awards in its 23 years of competition. NASA ranks second on the list of R&D 100 award recipients.

- end -

NASA News

National Aeronautics and
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For Release:

August 23, 1990

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RELEASE: 90-115

FLIGHT TESTS PROVE CONCEPT FOR JETLINER FUEL ECONOMY

The aerodynamic efficiency of future aircraft may improve sharply due to better-than-expected findings from a joint government-industry flight test program concluded this month. Such improved flight efficiency would result in reduced fuel consumption and lower operational costs for the U.S. airline industry.

Boeing modified a 22-foot section of a Boeing-757's wing outboard of the left engine and performed all the flight tests. Laminar air flow was achieved over the first 65 percent of the upper surface of the modified wing section, measured from the leading edge to the trailing edge of the wing, the first time the suction system was used and on all subsequent flights during the 5-month test period.

If the entire span of both wings was modified, a reduction in total airplane drag of up to 10 percent or more, depending on the application, could be realized. Each percent of drag eliminated by the U.S. transport fleet represents an estimated savings in fuel costs to the U.S. airline industry of $100 million annually.

NASA, Boeing and Air Force officials hailed the flight tests as one of the most significant events in the history of boundary-layer control. "We've known for years that laminar flow could be obtained under ideal conditions," Boeing Program Manager A. L. "Del" Nagel explained. "The real problem has been the difficulty of manufacturing sufficiently smooth permeable wing structure at reasonable cost. Now we've shown that we can do that."

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The research was aimed at preventing much of the turbulence that occurs naturally in the thin boundary layer of air at the surface of an aircraft's wing. Turbulence over the wing increases skin-friction drag, requiring the aircraft to use more fuel. In contrast, a smooth or "laminar" air flow significantly improves aerodynamic efficiency by reducing drag, which results in lower fuel consumption. The program is the first to demonstrate "hybrid laminar flow control" (HLFC) in flight.

Early investigations in the 1930's and 1940's showed that careful shaping of wings could achieve some laminar flow. But this "natural" laminar flow works only under restricted conditions. A more powerful technique, called laminar flow control, pulls a small amount of the boundary layer air through a porous or slotted wing skin by means of a suction system.

Laminar flow control has limitations, too. The holes or slots along major portions of the wing could compromise structural soundness or get clogged by insects or dirt. NASA and Boeing met this challenge by developing a variation called hybrid laminar flow control that limits the air extraction system to the leading edge, followed by a run of natural laminar flow.

The suction surface was a titanium skin with approximately 19 million tiny laser-drilled, closely spaced holes. A leading edge "Krueger" flap was integrated into the wing high-lift system to serve as an insect shield during takeoffs and landings.

The design incorporated innovations from earlier laminar flow projects using a NASA C-140 JetStar and the Air Force's X-21 research airplane. It also used the detailed data base gathered during NASA's F-14 Variable Sweep Transition Flight Experiment and the agency's 757 Natural Laminar Flow and Wing Noise Program.

NASA is considering a possible future flight test that would look at application of hybrid laminar flow at the inboard parts of the wings.

Greater drag reduction is anticipated on new aircraft with hybrid laminar flow incorporated in their initial designs. Government and industry researchers believe that HLFC technology could be introduced in new aircraft designs during this decade.

The program was jointly funded by NASA's Langley Research Center, Hampton, Va., Boeing Commercial Airplane Group, Seattle, and the U.S. Air Force Wright Research and Development Center, Wright-Patterson AFB, Ohio.

- end -

NASA News

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For Release:
Nov. 13, 1990

Release No. 90-129

NASA Invention Cited by "Popular Science" as Among 1990's Outstanding Products & Technological Achievements

NASA's Takeoff Performance Monitoring System (TOPMS) has been cited by the editors of Popular Science as one of 1990's technological achievements in the magazine's annual "Best of What's New" special awards section in its current (December) issue.

TOPMS is an invention designed to help airline pilots decide -- routinely or in a sudden emergency -- whether to continue or abort an attempted takeoff. The computer-driven system combines information already available in various locations in the cockpit with new information in a single, easy-to-use display. The TV-like display, located on the pilot's console, consists primarily of a runway graphic integrated with active graphic and alpha-numeric information, indicating the current "health" of the aircraft.

TOPMS was developed and tested at NASA's Langley Research Center, Hampton, Va. TOPMS inventors are aerospace engineers David B. Middleton, Dr. Raghavachari Srivatsan and Lee H. Person, Jr., a senior NASA research pilot who also serves as project pilot.

"Popular Science regularly provides its readers with news and analysis of innovative products and technological achievements," states Editor-in-Chief Fred Abatemarco. "We are

- more -

extremely pleased that our 'Best Of What's New' awards will be able to give proper recognition to those products and technologies that will help shape our lives."

This marks the third consecutive year that Popular Science has honored 100 of the year's most innovative products and achievements in science and technology. Winning selections were divided into 10 categories.

TOPMS was also featured in Popular Science's 1990 "Best of What's New" Exhibition on Nov. 13 at New York's Tavern on the Green. The Exhibition showcased the winning selections. CNBC, the Consumer News and Business Channel, will air a special prime-time cable program devoted to the "Best Of What's New" on Sunday, Nov. 18, at 8 p.m. EST with a repeat telecast at 1 a.m.

The 10 categories are: Audio & Video, Auto Technology, Aviation & Space, Cars, Computers & Electronics, Environmental Technology, Photography, Recreation, and Science & Technology.

Popular Science's December issue, featuring the "Best Of What's New," has been the magazine's best-selling issue since the awards were introduced in 1988.

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ADDITIONAL BACKGROUND INFORMATION ON TOPMS:

Evaluation pilots have expressed a desire to have a TOPMS-type display in their cockpit because it would provide valuable safety-related information not currently available during takeoff. Current cockpit systems do not provide a comprehensive "go/abort" decision aid during takeoff roll.

Statistics compiled over the years indicate that takeoff accidents account for about 12

percent of all aircraft accidents. Most takeoff-related accidents are attributable to some form of aircraft performance deficiency. Future accidents may be avoided if there is some way to monitor the progress of the takeoff roll, as with TOPMS, according to TOPMS inventors, Langley aerospace engineers David B. Middleton, Dr. Raghavachari Srivatsan and Lee H. Person, Jr., a senior NASA research pilot who also serves as project pilot.

Researchers have made more than 1,000 simulated takeoff runs with TOPMS in a transport-type ground simulator at Langley, where the system's math logic was exercised and display graphics were developed and tested. In addition, more than 50 actual takeoff or aborted takeoff runs have been conducted in a NASA jet transport, confirming that TOPMS can operate in realistic flight conditions, that it is compatible with aircraft sensors and systems and that it can be isolated from normal aircraft vibration. Flight test conditions have included excess drag, reduced thrust and simulated engine failures at various speeds.

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NASA News

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For Release:
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RELEASE: 90-134

NASA AND HONEYWELL CONDUCT AUTOMATED LANDING RESEARCH

NASA's Langley Research Center, Hampton, Va., and Honeywell's Space Systems Group, Clearwater, Fla., have sucessfully concluded a joint flight research project that may improve automated landing capabilities in spacecraft and aircraft.

During the flight tests performed over the last two months, NASA's Boeing 737 research airplane made 36 automated landings using a Honeywell integrated differential navigation system linked to the Global Positioning System (GPS). GPS is a worldwide constellation of U.S. satellites that provides precision navigation information.

The test data will form the basis for design of such systems in future spacecraft and will help researchers assess how risk can be reduced in automatic landings. The results also will help determine the accuracy of GPS-aided navigation systems that could ensure safe automatic landings under various weather conditions.

Currently there are 15 GPS satellites, four to eight of which were in view during the NASA/Honeywell flight tests. There will be 24 satellites in the GPS constellation when it is complete in 1993.

Six days of flight test from Oct. 23 to Nov. 14 accumulated 25 hours of flight time. Langley's Boeing 737 Transport Systems Research Vehicle (TSRV) was fitted with Honeywell's integrated Global Positioning Inertial Reference System/GPS Sensor Unit (GPSSU). A ground station with a second GPSSU receiver located at Wallops Flight Facility, Wallops Island, Va., provided differential GPS corrections to the aircraft via

-more-

VHF radio. During the tests, the TSRV made 111 landings, including 36 GPS-aided automatic touchdowns.

There are many potential space and commercial applications of this advanced technology. In the space arena, the technology could provide an automatic landing capability to the next-generation manned space transport vehicles that will be less demanding on the crew and require less training than the current Shuttle auto-landing system. Unmanned space vehicles could return expensive engines and avionics that otherwise would be expended after a single mission.

In commercial aviation, an automatic landing system based on differential GPS offers the potential for complete guidance: precision approaches from a variety of air traffic patterns, landing rollout and taxiing to the gate in poor visibility conditions.

This research and development effort is a cooperative project between Langley Research Center and Honeywell, Inc. Honeywell's efforts are led by its Space Systems Group with engineering support from its Systems and Research Center in Minneapolis and system hardware from its Commercial Flight Systems Group in Phoenix.

- end -

EDITORS NOTE: A video clip of the flight test activities is available to media representatives by calling 804/864-6120, or the Honeywell media contact, Mary Babin, at 813/539-5022.

National Aeronautics and
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NASA

Reply to Attn of

105A

November 28, 1990

Mr. Samuel W. Keller, Code ADA
Associate Deputy Administrator
National Aeronautics and Space Administration
Washington, DC 20546

Dear Mr. ~~Keller~~ Sam:

This letter summarizes recent Langley research activities during F.Y. 1990 funded by the Director's Discretionary Fund (DDF). I am strongly behind the concept, and use the Fund as a mechanism to support promising new research that has not yet been incorporated directly into any of our ongoing programs. It is very popular and beneficial to our researchers at Langley. Approximately half of our DDF projects eventually "graduate" to line RTOP support. I heartily endorsed J.R.'s decision to increase the F.Y. 1990 DDF allotments by 10% over F.Y. 1989, and the 25% increase he originally planned for F.Y. 1991. Up to now, our in-house researchers had to watch the continued decline of the only fund they could turn to for support of non-program high-risk research, while Headquarters' funding for such programs as SBIR and University Space Engineering Research continued a steady escalation to tens or hundreds of millions of dollars. While the 15% increase for this year's DDF is a start, I believe that strong consideration should be given to ultimately doubling the buying power of the present Fund and then allowing it to vary in the future as a fixed percentage of agency R&D funding as is already done for the SBIR program. Such a magnitude of increase in the Fund is needed in order to adequately exploit the innovativeness of Langley's employees.

Our F.Y. 1990 Discretionary Funds have been allocated to 20 projects which are described in the enclosed report. Several of the most interesting include a gamma ray attenuation sensor (page 23) that would allow gauging of the amount of slush hydrogen in a NASP propellant tank, regardless of the phase of the hydrogen; another study potentially important in hypersonic vehicle research is an investigation of the scaling relationships for development of a large electromagnetic railgun launcher (page 1) applicable to hypervelocity aerophysics. A new software architecture has been developed for aircraft design optimization using a knowledge-based system that was presented to the New Airplane Development Group at Boeing and is now used in a graduate design course at Stanford (page 21); and new multiple plate methods have been developed and used at Langley for the design and fabrication of highly complex

instrumented models with numerous orifices (page 33). In global change-related work, the concept of a non-mechanical "solid state" gas filter correlation radiometer was successfully demonstrated that could lead to a next-generation spaceborne remote sensor to study tropospheric pollutants (page 3); there is new evidence that solar and geomagnetic-induced variations of the magnetosphere cause changes in global ozone (page 25); and work has continued on a low-noise low thermal conductivity grounding strap for the NASA SAFIRE sensor (scheduled to fly on Eos) that is made of high-temperature superconducting ceramic, potentially represents the first application of such materials to a satellite, and could increase the signal-to-noise of the SAFIRE by a factor of 10 or more (page 12). A demonstration that images can be restored with better quality from less data using an end-to-end system optimization technique has a variety of applications including Mars rover imaging (page 26); and a concept has been proven that could provide oxygen for astronauts during a mission on Mars by disassociating carbon dioxide from the Martian atmosphere (page 9).

I am also pleased that finalists for Inventor of the Year in NASA, the team of James Clemmons and James F. Meyers of Langley, were recognized for their work on the "frequency domain laser velocimeter," a device that received its initial support from the Discretionary Fund back in 1985 after Meyers had proposed the concept. All the project descriptions in the report were written by the Principal Investigators. If you have any questions, please contact our Chief Scientist, Dr. Richard W. Barnwell, at FTS 928-6062. F.Y. 1991 Director's Discretionary Funds will be used to continue or complete the research described herein, with approximately one-third to one-fourth for new activities.

Sincerely,

Pete

Richard H. Petersen
Director

Enclosure
LaRC 1990 DDF Report

cc:
NASA Hq--A/Administrator
NASA Hq--AD/Deputy Administrator
NASA Hq--ADA/Associate Deputy Administrator
NASA Hq--ADA-2/Director, Office of Special Studies
NASA Hq--ADB/Assistant Deputy Administrator
NASA Hq--B/Comptroller
NASA Hq--C/Assistant Administrator for Commercial Programs
NASA Hq--D/Assistant Administrator for Headquarters Operations
NASA Hq--E/Assistant Administrator for Equal Opportunity Programs
NASA Hq--G/General Counsel
NASA Hq--H/Assistant Administrator for Procurement
NASA Hq--K/Director of Small and Disadvantaged Business Utilization
NASA Hq--L/Assistant Administrator for Legislative Affairs
NASA Hq--M/Associate Administrator for Space Flight
NASA Hq--N/Associate Administrator for Management
NASA Hq--O/Associate Administrator for Space Operations
NASA Hq--P/Associate Administrator for Public Affairs
NASA Hq--PM/Director of Media Services Division
NASA Hq--PO/Director of Public Services Division
NASA Hq--PT/Director of Television Development Division
NASA Hq--Q/Associate Administrator for Safety and Mission Quality
NASA Hq--R/Associate Administrator for Aeronautics, Exploration and Technology
NASA Hq--S/Associate Administrator for Space Science and Applications
NASA Hq--W/Inspector General
NASA Hq--X/Associate Administrator for External Relations
Directors, NASA Field Installations
Director, Jet Propulsion Laboratory

Langley Research Center

1990 DIRECTOR'S DISCRETIONARY FUND REPORT

November 1990

1990 DIRECTOR'S DISCRETIONARY FUND

ANNUAL REPORT

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Progress Report FY 1990

Feasibility Studies of a Proposed Hypervelocity Aerophysics Facility

W. I. Scallion, Robert D. Witcofski, and David J. Carter

The purpose of this research is to establish the feasibility of developing a hypervelocity free-flight aero-ballistic range facility designed to conduct fundamental and applied research on complex, instrumented, lifting and non-lifting shapes from suborbital to planetary return entry velocities in a real-gas entry environment. The investigation was initiated in FY 1986.

Total funding authorized prior to 1988 was $70K, of which $50K was obligated, and $20K was returned for use in other DDF programs. $20K was authorized for 1988, and no funds were authorized for 1989. A model/sabot integration study funded with FY 1988 money was completed in June of 1989. Funding for continuation of this particular effort subsequently transitioned to a normal R&D RTOP. DDF funding authorized with FY 1990 money amounts to $77K for an experimental and theoretrical investigation of the effects of railgun bore size on the characteristics of plasma and hybrid armatures. The objective of this effort is to conduct experimental and theoretical investigations to develop the necessary scaling relationships for the development of large, electromagnetic railgun launchers applicable to the proposed Langley hypervelocity aerophysics test facility and to earth-to-space launch facilities. The experiments during the current fiscal year will be conducted with railgun barrel sections having diameters ranging from 10 to 100 mm, using free-running arc armatures at bore pressures ranging from 1 torr to 1 atmosphere. From these experiments the scaling relationships of the arc voltage versus bore

size and current will be developed. In addition the scaling laws governing the ablation threshold of various bore insulator materials and the viscous drag with respect to bore size and current will be derived. The required theoretical development will be conducted in parallel with the experimental investigations.

This investigation will be conducted during FY 1991, and in order to complete it, additional time and funding will be required. It will be necessary to extend the investigation to cover bore diameters up to 200 mm, and to conduct the hybrid armature experiments. This will require FY 1991 funding of $90K for fabrication and testing of the 200mm barrel, and $30K for fabrication and conducting the hybrid armature experiments.

W. I. Scallion

W. I. Scallion

R. D. Witcofski

R. D. Witcofski

D. J. Carter

D. J. Carter

Director's Discretionary Fund
Progress Report

Title: Investigation of a Gas Filter Correlation Radiometer Concept for Spaceborne Remote Sensing of the Atmosphere

Principal Investigators: Glen W. Sachse, FED
Liang-guo Wang, College of William and Mary

Other NASA Team Members: H. Andrew Wallio, ASD
Henry G. Reichle, ASD

Purpose of investigation:

Gas correlation spectroscopy is a powerful measurement tool for the determination of the concentration of trace atmospheric gases. Gas filter correlation radiometers (GFCR's) have made significant contributions to our knowledge of the atmosphere by providing remote atmospheric measurements from a variety of platforms including aircraft and spacecraft. Spaceborne measurements of CO in the middle and upper troposphere using light choppers have been previously achieved in the MAPS (Mapping Air Pollution from a Satellite) program. A next generation GFCR denoted as TRACER (Tropospheric Radiometer for Atmospheric Chemistry and Environmental Research) using rotating gas cells is currently under investigation. The conventional GFCR instruments , however, are generally mechanically complex requiring rapidly rotating gas cells or light choppers. The objective of this DDF research is to investigate a "non-mechanical optical path modulation" concept that may have a revolutionary impact on the development of future GFCR's. The new GFCR approach involves the use of a polarization modulator in conjunction with polarization sensitive beamsplitters as a solid-state "optical switch" to rapidly alternate the path of incoming radiation between the two GFCR optical paths. This polarization modulation GFCR does not require rapidly moving mechanical parts and therefore has potential advantages including: (1) long operational life (an important consideration for spaceborne applications); (2) a much higher detection sampling frequency (≈ 100 kHz) which, for a nadir-viewing GFCR, freezes the radiometer's view of the Earth and minimizes 1/f noise sources; and (3) high sensitivity since the difference signal is obtained from a single detector instead of subtracting two large signals from different detectors.

Initiation Year: 1989

Aggregate Funding FY89 and Earlier: 68K

Authorized FY90 Funding: 60K

Expected Expenditure of FY90 Funding: Contract (College of W&M) 40K
Scientific Equipment 20K

Status (End of FY 90): Continued in FY91 with 30K of FY90 funding.

Expected Completion Date: June 1, 1991

FY90 Accomplishment:

A. Results:

The "non-mechanical optical path modulation" concept was successfully demonstrated during FY90. The following steps were completed in achieving that accomplishment:

(1) Component Characterization and Evaluation. Investigation of key components was completed including: peak transmission and bandwidth measurements of the 4.6μm interference bandpass filter; extinction ratio measurements for three polarization beamsplitters and heat dissipation measurements of silicon and zinc selenide photo-elastic modulators (PEM's) at quarter-wave and half-wave modulation.

(2) Breadboard Fabrication. A zinc selenide PEM was used to fabricate a GFCR breadboard. The effect of PEM modulation strength on the optical balance of the two GFCR paths was investigated. A tunable polarization beam attenuator was made and installed to achieve the optical balance between the two GFCR paths. A PC based computer data acquisition system (hardware and software) was completed to meet the experiment needs.

(3) Experimental Demonstration. CO correlation measurements in the 4.7 μm band were successfully demonstrated using the new GFCR breadboard. The purpose of this demonstration was to simulate remote atmospheric measurements of CO. The experiment included a series of measurements of CO fractional absorption ($\Delta V/V$) at several fixed CO partial pressures (0.2, 0.5, 1.0, 3.0 and 5.0 torr) with a continuously varying total air pressure from 5 torr to 700 torr. These CO mixtures simulated the range of CO optical depths and atmospheric pressures in the Earth's atmosphere.

B. Patents: A patent disclosure of the application of non-mechanical optical path modulation to GFCR's has been submitted.

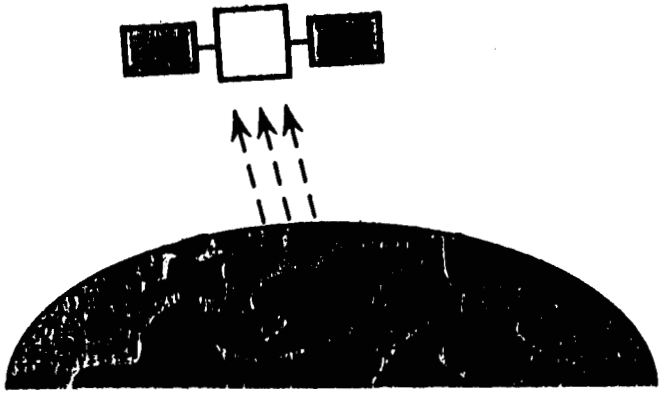
C. Meeting Presentations: A report was presented at the Topical Meeting on Optical Remote Sensing of the Atmosphere, Feb. 12-15, 1990 (Optical Society of America). A journal article is in preparation.

Future Plans: (1). CO and CH_4 correlation measurements in the 2.3 μm region will be demonstrated using this GFCR breadboard with a 900 K blackbody. (2) Similar measurements in the 4.7 μm region will be performed using a 300 K blackbody temperature. This experiment will require more efficient light collecting optics and will better simulate the $\approx$300 K blackbody temperature of the earth. The breadboard instrument will be tested on the MAPS Ground Support Unit.

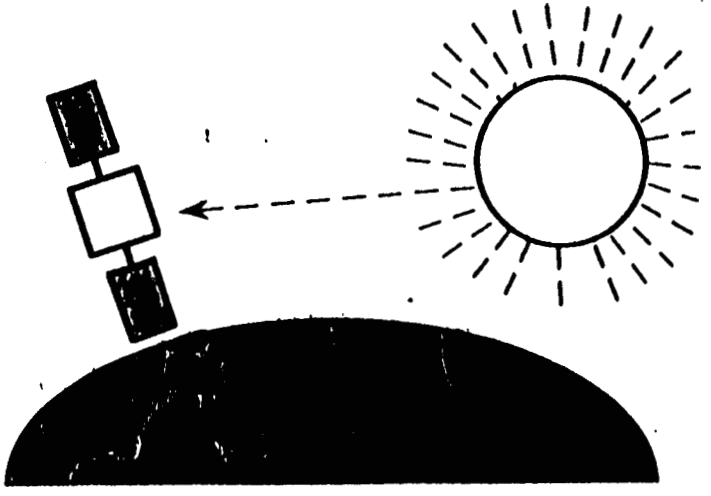
The completion date has been extended to June 1, 1991 due to the unexpected involvement of the principal investigators to other Langley projects(TRACER and LASE I back-up) during FY90.

GFCR MEASUREMENT APPLICATIONS

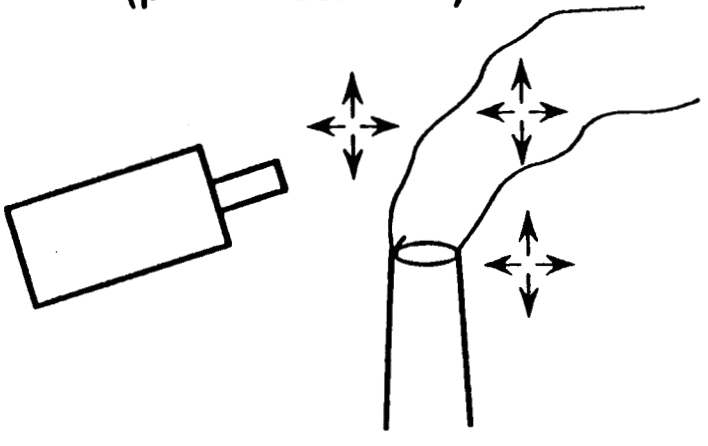
NADIR
(airborne / spaceborne)



SOLAR OCCULTATION
(airborne / spaceborne)



UV BACKSCATTER
(plume studies)



IN SITU
Industrial, air quality,
atmospheric studies

UPWARD-LOOKING MEASUREMENT OF POLLUTANTS

The Relationship Between Six Sociometric Variables and the Use of NASA Technical Reports by U.S. Aerospace Engineers and Scientists

Thomas E. Pinelli
NASA Langley Research Center

and

John M. Kennedy
Indiana University

ABSTRACT

When aerospace engineers and scientists need or want technical information, they have two basic alternatives. They can obtain it through observation and experimentation or they can obtain it from a variety of existing information products and services. The decision rules that determine which alternative they chose are undoubtedly exceeding complex. Further, the decision to choose from the two alternatives is assumed to be influenced by a variety of factors. Assuming rational behavior serves as the basis for decision making, the selection of observation/experimentation or an existing information product or service will depend on a subjective estimate, or perception, of the likelihood of success in acquiring the desired information by these two alternatives, within an acceptable time, and on the perception of relative "cost" of these alternatives. Further, if a decision is made to use an existing information product or service, the recognition exists that there is more than one product or service from which the information may be obtained. Theory holds that certain "sociometric" variables enter the process at this point and that the decision to choose becomes a choice between perceived "cost," in terms of physical effort or funds expended, and perceived "benefit," the likelihood that the information obtained is the information needed or wanted.

As part of a **Phase 1** activity of the NASA/DoD Aerospace Knowledge Diffusion Research Project, which is concerned with the information-seeking habits and practices of U.S. aerospace engineers and scientists, the relationship between six sociometric variables (accessibility, ease of use, expense, technical quality or reliability, comprehensiveness, and relevance) and the use of NASA technical reports is being investigated. A systematic sample of AIAA members served as the study population. A self-administered mail questionnaire was used to collect information the use/non-use of conference-meeting papers, journal articles, in-house technical reports, and NASA and DoD technical reports. Survey participants were also asked to rate each of the information products on their accessibility, ease of use, expense, technical quality or reliability, comprehensiveness, and relevance. The responses constitute a rating of NASA technical reports within the context of other aerospace information products and will be used to determine the extent to which the six variables explain the use of NASA technical reports by U.S. aerospace engineers and scientists.

FUNDING

1989	39.7K	Code RF	RTOP 505-90-11
1990	15.0K	DDF	

FUNDING INSTRUMENT

NASA Grant NAGW-1682 Indiana University

BACKGROUND

The **NASA/DoD Aerospace Knowledge Diffusion Research Project** is a cooperative effort that is sponsored by NASA, Codes RF and NTT, and the DoD, Office of the Assistant Secretary of the Air Force, Deputy for Scientific and Technical Information. The research project is a joint effort of the Indiana University, Center for Survey Research and the NASA Langley Research Center. The **NASA/DoD Aerospace Knowledge Diffusion Research Project** will provide descriptive and analytical data regarding the flow of STI at the individual, organizational, national, and international levels. It will examine both the channels used to communicate information and the social system of the aerospace knowledge diffusion process. The results of the project should provide useful information to R&D managers, information managers, and others concerned with improving access to and utilization of STI. The initial thrust of the project is largely exploratory and descriptive; it focuses on the information channels and the members of the social system associated with the Federal aerospace knowledge diffusion process. As scholarly inquiry, the project has both an immediate and a long term purpose. In the first instance, it provides a pragmatic basis for understanding how the results of NASA/DOD research diffuse into the aerospace R&D process. Over the long term, the project will provide an empirical basis for understanding the aerospace knowledge diffusion process at the individual, organizational, national, and international levels.

Phase 1 of the 4-phase project is concerned with the information-seeking habits and practices of U.S. aerospace engineers and scientists, with particular emphasis being placed on their use of federally funded aerospace STI products and services. **Phase 2** focuses on aerospace knowledge transfer and use within the larger social system, placing particular emphasis on the flow of aerospace STI in government and industry and the role of the information intermediary (i.e., the aerospace librarian/technical information specialist) in knowledge transfer. **Phase 3** focuses on knowledge use and transfer at the individual and organizational levels in the academic sector of the aerospace community. Faced with shrinking enrollments, particularly at the graduate level, university aerospace programs must find ways to maintain the talent pool that will advance aerospace technological development and guarantee U.S. competitiveness. To prepare future aerospace engineers and scientists, academic programs must have access to "state of the art" STI. Consequently, NASA and the DOD must ensure the effective and efficient delivery of Federally funded aerospace STI. An understanding of individual information-seeking behavior, the flow of aerospace STI, and the STI transfer system in academia should provide NASA/DOD with important insights for program development. **Phase 4** examines knowledge production, use, and transfer among non-U.S. individuals and aerospace organizations, specifically in Western Europe and Japan. As

U.S. collaboration with foreign aerospace technology producers increases, a more international manufacturing environment will arise, fostering an increased flow of U.S. trade. At the same time, however, international industrial alliances will result in a more rapid diffusion of technology, prompting the U.S. aerospace industry to forge ahead with new technological developments. To cooperate in joint ventures as well as to compete successfully at the international level, U.S. aerospace industries will need to develop methods to collect, translate, analyze, and disseminate the best of foreign aerospace STI. Therefore, an understanding of the process by which non-U.S. aerospace engineers and scientists communicate at the individual and organizational levels becomes essential.

STATUS

In the Phase 1 survey, data were collected from **only** those AIAA members who used NASA technical reports. **Only** users were asked to complete the question concerning the extent to which their use was influenced by the six sociometric variables. To create a more objective observation, a follow-up questionnaire was sent to those members of the original survey who **did and did not use** NASA technical reports. Both users and non-users were asked to rate conference-meeting papers, journal articles, in-house technical reports, and U.S. government technical reports on their accessibility, ease of use, expense, technical quality or reliability, comprehensiveness, and relevance.

Surveys were sent to 4 000 AIAA members. Approximately 2 000 were received by the established cutoff date. Data entry is complete. We are in the process of matching these data with the data collected in Phase 1. The phase 1 and follow-up data will be compared. The goal is to determine if the users and nonusers are different in how they rate NASA technical reports according to these characteristics. We expect to complete the analysis and to report the findings in early spring 1991.

FY 1990 ACCOMPLISHMENTS

Pinelli, Thomas E.; Myron Glassman; Walter E. Oliu; and Rebecca O. Barclay. **Technical Communications in Aeronautics: Results of an Exploratory Study**. Washington, DC: National Aeronautics and Space Administration. NASA TM-101534, Part 1, February 1989. 106 p. (Available from NTIS, Springfield, VA; 89N26772.)

Pinelli, Thomas E.; Myron Glassman; Rebecca O. Barclay; and Walter E. Oliu. **The Value of Scientific and Technical Information (STI), Its Relationship to Research and Development (R&D), and Its Use by U.S. Aerospace Engineers and Scientists**. Paper presented at the European Forum "External Information: A Decision Tool" 19 January 1990, Strasbourg, France.

Blados, Walter R.; Thomas E. Pinelli; John M. Kennedy; and Rebecca O. Barclay. **External Information Sources and Aerospace R&D: The Use and Importance of Technical Reports by U.S. Aerospace Engineers and Scientists**. Paper prepared for the 68th AGARD National Delegates Board Meeting, 29 March 1990, Toulouse, France.

Kennedy, John M. and Thomas E. Pinelli. **The Impact of a Sponsor Letter on Mail Survey Response Rates.** Paper presented at the Annual Meeting of the American Association for Public Opinion Research. Lancaster, Pennsylvania, May 19, 1990.

Pinelli, Thomas E.; Rebecca O. Barclay; John M. Kennedy; and Myron Glassman. **Technical Communications in Aerospace: An Analysis of the Practices Reported by U.S. and European Aerospace Engineers and Scientists.** Paper presented at the International Professional Communication Conference. Guildford, England, September 13, 1990.

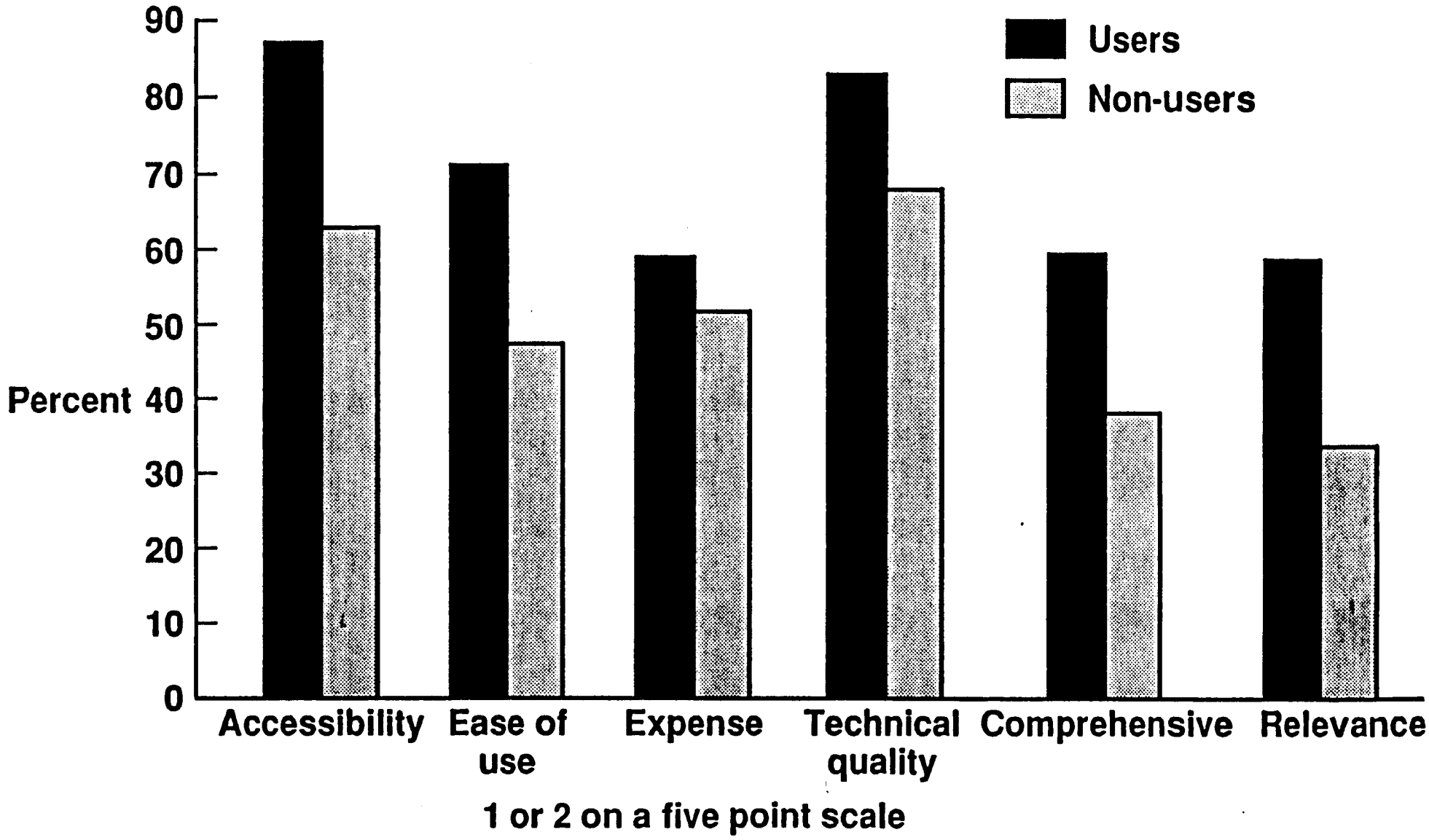
Pinelli, Thomas E.; John M. Kennedy; and Rebecca O. Barclay. **The Role of the Information Intermediary in the Diffusion of Aerospace Knowledge.** Science and Technology Libraries 11:2 Winter 1990.

PLANNED FUTURE WORK

The investigation into the attitudes and behaviors that lead aerospace engineers and scientists to choose information sources such as NASA technical reports will continue during FY 1991. In particular, we recognize that the members of the AIAA are not involved in the entire spectrum of aerospace R&D. Our findings that they are under represented in design, development, manufacturing, and production. We will continue our research by surveying U.S. aerospace engineers and scientists who are members of the Society of Automotive Engineers (SAE) to determine their use of information sources. We will also investigate the possibility of surveying U.S. aerospace engineers and scientists who do not belong to professional societies. The anticipated outcome of this research is a fuller understanding of the information-seeking habits and practices of U.S. aerospace engineers and scientists in academia, government, and industry.

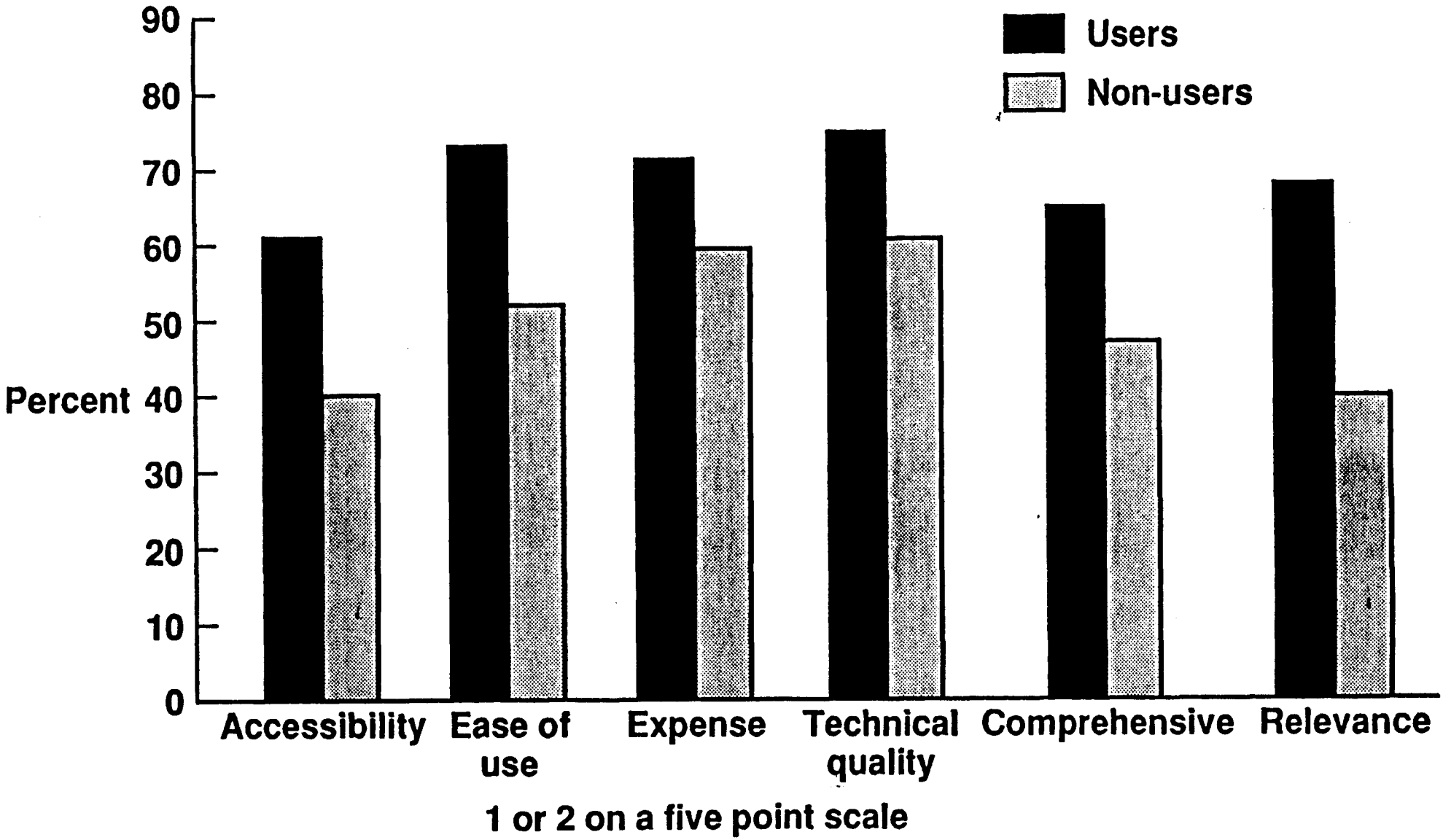
We expect that the work we are doing in Phase 1 will provide the basis for a more broadly defined research project that will examine the role of aerospace engineers and scientists in the international transfer of aerospace R&D. In particular we anticipate seeking funding for surveys of Japanese and Western European aerospace engineers and scientists.

RATING OF JOURNAL ARTICLES BY U.S. AEROSPACE ENGINEERS AND SCIENTISTS



G-JOURNAL ART/90-215

RATING OF NASA TECHNICAL REPORTS BY U.S. AEROSPACE ENGINEERS AND SCIENTISTS



G-NASA TECH REPORTS/90-21

TITLE OF PROJECT:

Separation of O_2 From the Martian Atmosphere

PROJECT LEADER:

R. A. Outlaw

PURPOSE OF INVESTIGATION:

The atmospheric pressure of Mars is approximately 5 torr and comprised predominantly of CO_2. In order to provide pure oxygen for astronaut consumption (and other applications) during a manned mission to Mars, the technique of O_2 separation from a CO_2 atmosphere by using a glow discharge method of dissociation, i.e., $CO_2 \rightarrow CO + O$, combined with the subsequent separation of the O by permeation through a Ag membrane, is being studied.

INITIATION YEAR:

FY 1990

FUNDING FY 1990:

75 K; In house: 30 K
Grants: 45 K ODU
Dr. R. L. Ash, PI
Mr. Dongchaun Wu

STATUS THROUGH FY 1990:

An apparatus was fabricated that employs glow discharge in combination with a heated permeation membrane. A very small but steadily increasing permeation level of oxygen through a Ag membrane was initially observed using an upstream pressure of 0.5 torr CO_2. The application of 350 V dc and 50 mA current increased the measured downstream flux of O_2 by a factor of 50. The glow discharge provided a substantial quantity of atomic neutrals and ions which adsorbed and then dissolved into the Ag. Subsequently, the atoms migrated through the membrane and desorbed as O_2 in a separate chamber. This work establishes the proof of the proposed concept. In order for this concept to be scaled up to provide sufficient oxygen for astronaut consumption, the flux levels must be substantially increased.

Several ways have been considered: Ag alloys, Ag-Rdnanocrystals and thin-film Ag coatings on porous Al_2O_3 disks. All of these techniques are presently under study and should provide flux increases approaching 1000.

It is requested that this work be continued in FY 1991 at the same 75-K level.

EXPECTED COMPLETION DATE:

March 1992

FY 1990 ACCOMPLISHMENTS:

- Proof of concept completed
- Patent submitted
- First permeation data through Ag nanocrystals
- First fabrication of Ag thin films (100 nm) coated porous $Al_2 O_3$ disks. Patent in preparation
- Published article in J. Appl. Phys. entitled "O_2 and CO_2 Glow Discharge-Assisted Oxygen Transport Through Ag"
- Observed enhanced oxygen transport through Ag Zr alloys. To be published in Journal of Materials Research.

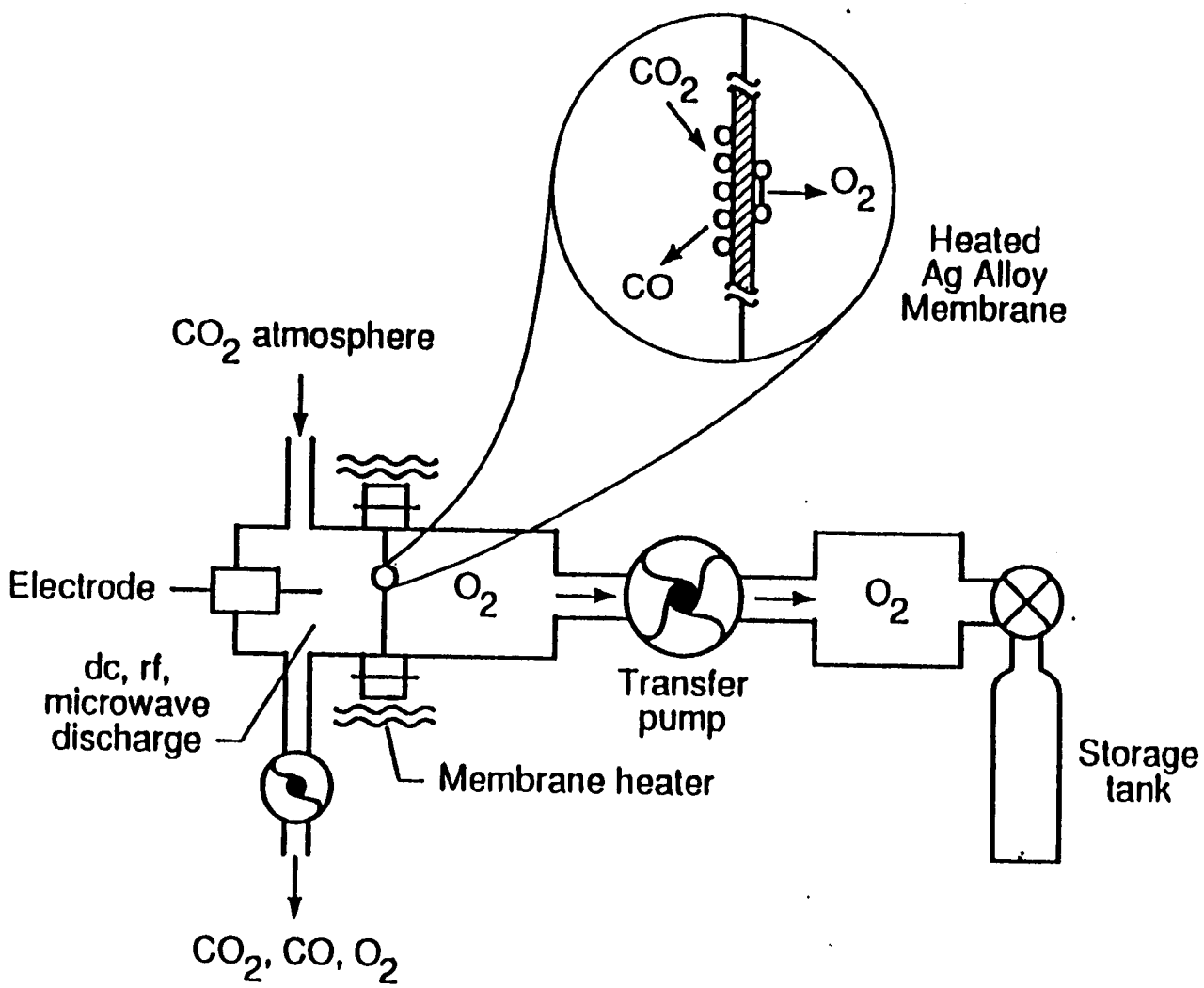
PLANNED FUTURE WORK:

Continued studies on oxygen transport enhancement through Ag alloys, Ag nanocrystals, and Ag thin films.

- Parametric studies of a glow discharge mechanism to enhance oxygen atom formation.

- The determination of glow discharge permeation energy requirements.

EXPERIMENTAL SCHEMATIC



Ultrasonic Characterization of High T_c Superconductors

William P. Winfree
Instrument Research Division

Purpose

Perform research for the development of new ultrasonic techniques for characterization of high temperature superconductors.

Accomplishments

A computer controlled measurement system for characterization of the acoustic properties of superconducting properties has been developed at LaRC. Measurements have been performed on a variety of samples supplied by national labs such as Naval Research Lab and Argonne National Lab and universities such as University of Houston and University of Wisconsin-Milwaukee.

In particular, measurements have been performed on Bi-Sr-Ca-Cu-O which is known to have two phases with two different T_c's which are separated by approximately 20° K. Ultrasonic measurements of the samples show two separate local peaks in the attenuation data and variations in the velocity data at these phase transitions. It may be possible to use the area under these peaks to determine the percentage of each of the phases in the sample. Further development of this measurement could result in a nondestructive technique for characterization of the percentage of the different phases (both superconducting and nonsuperconducting) in the bulk of superconducting material which would give a characterization of their superconducting properties.

Two samples of $YBa_2Cu_3O_7$ cut from the same batch were measured to assess accelerated testing of space worthiness. The one placed in a vacuum has shown certain changes in acoustic properties in the early stage when compared with the other maintained in air at ambient pressure.

Publications: This year the work has lead to 5 presentations, 3 papers in proceedings, 1 journal article and 2 chapters which will appear in the next volume of Physical Acoustics. A partial listing of the titles is:

1. "Enhance ultrasonic attenuation of Tl-Ca-Ba-Cu-O at the superconducting transition", K. J. Sun, W. P. Winfree, M-F. Xu, M. Levy, Bimal. K. Sarma, A. K. Singh, M. S. Osofsky, and V. M. Le Tourneau, Phys. Rev B, 42, 2569-2572
2. "Ultrasonic Attenuation of the Magnetic Superconducting System $Er_{1-x}Ho_xRh_4B_4$", K. J. Sun and M. Levy, Chapter 3 in "Ultrasonics on High Tc and other Unconventional Superconductors" of "Physical Acoustics"
3. "Sound Propagation in High Tc Superconductors", M. Levy, M.-F. Xu, B. K. Sarma and K. J. Sun, Chapter 4 in "Ultrasonics on High Tc and other Unconventional Superconductors" of "Physical Acoustics"

Future work

Measurements will be continued on samples held in a vacuum to determine if acoustic measurements can be used for accelerated testing of space worthiness. More measurements will be made of the acoustic properties of Bi-Sr-Ca-Cu-O near the two different transition temperatures to determine the relationship between these properties and the superconducting properties.

Initiation Year: 1988
Funding for FY 1988: $55K
Funding for FY 1989: $55K
In-house: $0K
Task assignment College of William and Mary: $55K

Current Status: This research was supported with FY 89 funds through August 1990. No other funds have been found to replace this funding source.

Expected Completion Date: Work will continue on this program for the duration of the task assignment with William and Mary funded by DDF until the funding is exhausted.

FY 1990 RESEARCH PROJECT SUMMARY

TITLE: High-Temperature Superconductivity Material (YBa_2Cu_3Ox) Applied to Devices for Aerospace Technology

RESEARCH TEAM: John D. Buckley, Stephanie A. Wise, Warren C. Kelliher, Ingred A. Carlberg, and Timothy D. Bryant, NASA Langley Research Center; Gene H. Haertling, Matthew W. Hooker, Clemson University; Raoref Selim and Randall Caton, Christopher Newport College.

PURPOSE OF INVESTIGATION: The high Tc ceramic superconductor LaRC-sponsored effort at Clemson University is presently focused on developing and demonstrating the feasibility of fabricating composite linear bearings using the Meissner effect (shown in figure) and rigidly supported, environmentally protected superconducting circuit elements such as 1) conductors, 2) coils, 3) connectors, 4) crossovers on dielectric substrates for microelectronic applications with emphasis on a specific application for the NASA-SAFIRE program; i.e. a low-noise low thermal conductivity, superconducting grounding strap for a highly sensitive, far-infrared, atmospheric detector (see figure). The device is based on the concept that these superconducting ceramics are brittle by nature, and that a reasonable approach to this limitation is to design and fabricate devices on a rigid carrier rather than a flexible one. Specifically, it utilizes a pre-formed, sintered, and tested material that is bonded to a rigid substrate such as in a hybrid circuit. This concept has the advantages of 1) pre-testing of the superconducting material separate from the substrate, 2) optimization of the superconducting properties of the material without limitations imposed by the substrate, 3) wider selection of substrate materials since the high temperature processing step precedes mounting onto the printed circuit board, 4) freedom from firing shrinkage and other numerous material compatibility problems, and 5) high anticipated reliability because of its rigid design and encapsulation from the environment.

INIATION YEAR: 1987

AGGREGATE AMOUNT OF FUNDING AUTHORIZED IN FY 1989 AND EARLIER YEARS 1987-1989: $298K

FUNDING AUTHORIZED FOR FY 1990: $55K

STATUS OF INVESTIGATION AT END OF FY 1990

Transitioned or to Transition to Other Funding--Two funding sources for future work are currently being pursued both of which are "promisory" in light of the current bridgetary uncertainties. One hundred and sixty thousand (160K) has been requested under Commercial Use of Space for the FY 1991, and Code R has initiated negotiations for an early build and test of passive High Tc devices for a Goddard Space Flight Center mission. Because of the uncertainties of these funding sources, it is requested that $75K be set aside in DDF funding as a contingency to assure continuation of the Clemson University and Christopher Newport College efforts. As soon as one or both of the funding sources become viable, the $75K of DDF funding would be released or returned to meet other objectives.

FY 1990 ACCOMPLISHMENTS:

1. Developed, tested, and evaluated the rigid superconduct/substrate concept as a new technique for fabricating practical superconducting components such as conducting links, coils, and hybrid circuit elements.

2. Established the following: 1) an oxide process capable of producing homogeneous and reproducible $YBa_2Cu_3O_{7-x}$ (123) high Tc ceramic materials, 2) a tapecasting technique for fabricating the flexible pre-forms, and 3) a sintering method to reliably produce the rigid superconducting material displaying the Meissner effect and possessing a Tc greater than 90°K..

3. Demonstrated techniques for splicing and/or joining the 123 superconductor with no loss in superconducting properties.

4. Developed methods for terminating the high Tc superconducting ceramic with very low electrical resistivity (2×10^{-9} ohm-cm^2) contacts and connectors.

5. Evaluated and selected epoxy encapsulants suitable for protecting the high Tc ceramic superconductor from the environment and also capable of providing additional rigid support to the circuit element.

6. Developed flexible high Tc superconducting composites which could be applied to electromagnetic shielding and Meissner magnetic bearing applications.

7. Demonstrated the achievement of a melt textured 123 superconducting material with a critical current in excess of 1000 A/cm^2.

8. Developed an acetate-derived, chemically processed, sol-gel process for fabricating high Tc superconducting thin films.

PATENTS:

Patent Disclosures

1. "Ceramic Superconducting Circuit Elements and Method of Making Same," Gene H. Haertling and John D. Buckley, NASA Langley Research Center, August 1990.

2. "Ceramic Superconducting Composites and Method of Making Same," Gene H. Haertling and John D. Buckley, NASA Langley Research Center, August 1990.

3. "Acetate Process for Preparing $YBa_2Cu_3O_{7-x}$ Superconducting Thin Films," Gene H. Haertling, NASA Langley Research Center, August 1990.

FY 1990 ACCOMPLISHMENTS (CONTINUED):

REPORTS, JOURNAL ARTICLES, OTHER PUBLICATIONS

REPORTS

1. "Development and Evaluation of Superconducting Circuit Elements," Semiannual Report, May 8, 1990.

2. Final Report in progress.

JOURNAL ARTICLES

1. "The Effects of Electron Irradiation of YBa_2Cu_3Ox with Gold Bead Contacts," R. Caton, R. Selim, A. M. Buoncristiani, Christopher Newport College, Newport News, VA; C. E. Byvik, W. J. Schaefer, Assoc. Inc. Arlington, VA, Journal of Applied Physics, Vol. 67, Pg. 7478-7482, June 1990.

2. "Low Resistance Noble Metal Contacts to High Temperature Superconductors," R. Selim, C. Caton, and A. M. Buoncristiani, Christopher Newport College, Newport News, VA; C. E. Byvik and R. A. Edahl, Jr., NASA Langley Research Center; S. A. Wise, Clemson University, SC; Journal of Applied Physics, Vol. 67, Pg. 376-378, January 1990.

3. "The Effects of Repeated Cycling from Liquid Nitrogen to Ambient Temperatures on High Tc Superconductors," J. Beaufart, R. Caton, and R. Selim, Christopher Newport College, Newport News, VA; National Conference on Undergraduate Research, Schenectady, NY, April 1990 (to be published).

4. "Improved Sintering Process of Superconducting YBa_2Cu_3Ox," R. W. McKitrick, Jr., R. Selim, and R. Caton, Christopher Newport College, Newport News, VA; Conference on Undergraduate Research, Schenectady, NY, April 1990 (to be published).

5. Tech Brief - "Ceramic Superconducting Composites and Method of Making Same," J. D. Buckley, NASA Langley Research Center and G. H. Haertling, Clemson University, NASA Langley Research Center LAR-14534 (accepted September 1990)

FY 1990 ACCOMPLISHMENTS (CONTINUED):

PAPERS FOR PRESENTATION AT PROFESSIONAL SOCIETY MEETINGS

1. "High Tc Ceramic Superconducting Circuit Elements," Gene H. Haertling, ISHM 1st Joint Technology Conference, San Diego, CA, March 26-28, 1990 (presented).

2. "Low Resistivity Contacts to $YBaCu_3O_{7-x}O_3$ Superconductors," Chi-Shiung Hsi and Gene H. Haertling, American Ceramic Society, Ceramic Science and Technology Congress, Orlando, FL, November 12-15, 1990 (accepted).

3. "$YBa_2Cu_3O_{7-x}$ - Ag Composites Prepared by the Co-Precipitation Route: Analysis of Physical and Superconducting Properties as a Function of Ag Content," V. V. Modi, B. I. Lee, and G. H. Haertling, American Ceramic Society, Ceramic Science and Technology Congress, Orlando, FL, November 12-15, 1990 (accepted).

4. "Densification of Tape Cast $YBaCu_3O_{7-x}$ by Blending Powders with Varying Particle Size Distributions," V. V. Modi, B. I. Lee, G. H. Haertling, and D. R. Dinger, American Ceramic Society, Ceramic Science and Technology Congress, Orlando, FL, November 12-15, 1990 (accepted).

5. "Characteristics of Co-Precipitated $YBaCu_3O_{7-x}$ Powders Subjected to Varying Calcining Conditions," V. V. Modi, B. I. Lee, and G. H. Haertling, American Ceramic Society, Ceramic Science and Technology Congress, Orlando, FL, November 12-15, 1990 (accepted).

6. "Ceramic Superconducting Components," Gene H. Haertling, American Ceramic Society, Ceramic Science and Technology Congress, Orlando, FL, November 12-15, 1990 (accepted).

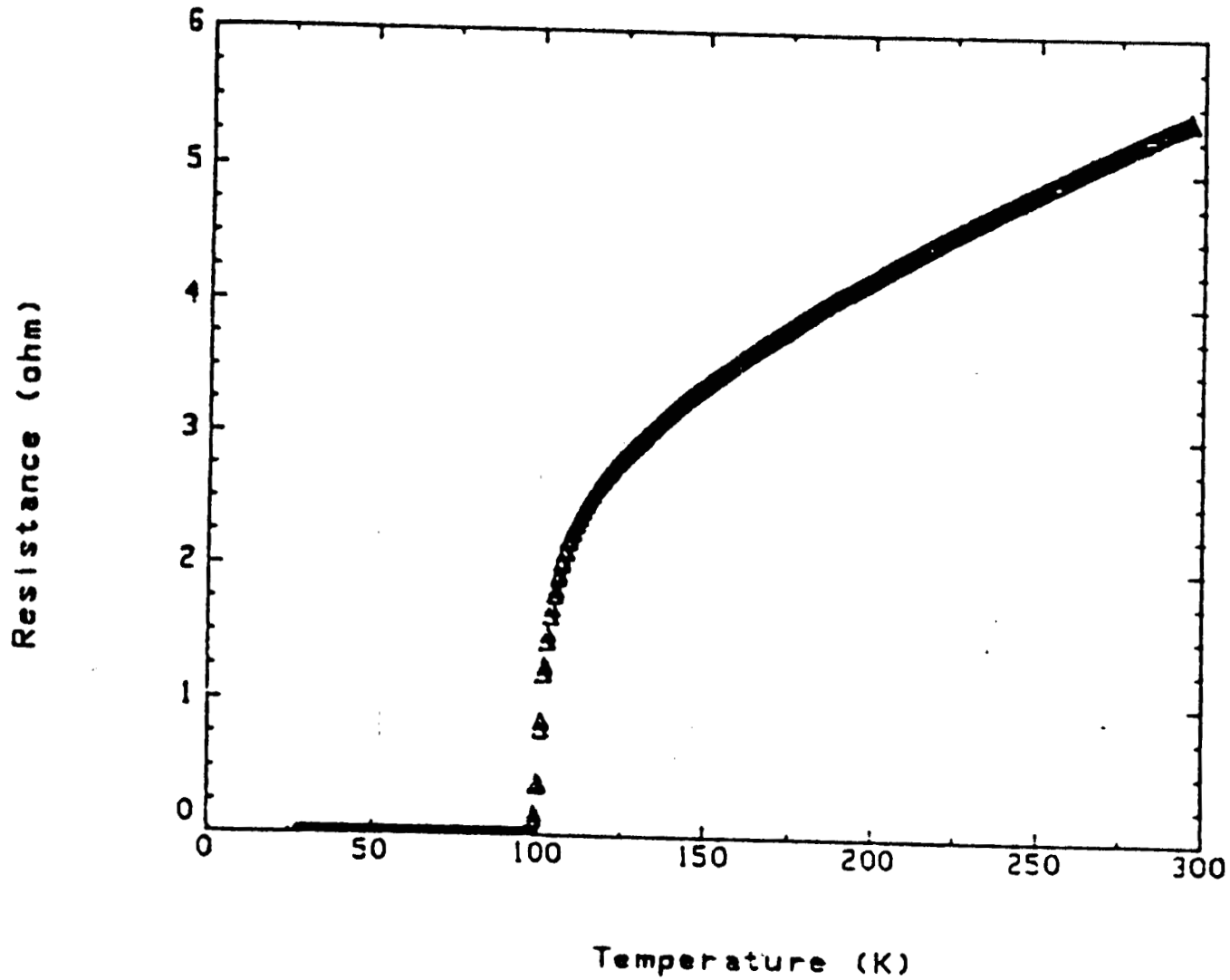
7. "High Temperature Superconductivity Materials Applied to Devices for Aerospace Technology," J. D. Buckley, S. A. Wise, NASA Langley Research Center, Hampton, VA; Gene H. Haertling, M. W. Hooker, Clemson University, Clemson, SC; R. Selim, Christopher Newport College, NASA High Temperature Superconductors Program Status Review Catholic University, Washington, DC, August 1, 1990.

PLANNED FUTURE WORK

A collaborative and interactive testing program between personnel at Clemson University (Clemson, SC) and Westinghouse Savannah River Company (Aiken, SC) is directed toward obtaining first-time field test data on the superconducting grounding strap described in purpose of investigation. This work complements and builds on the efforts presently being carried on at Clemson. It is designed to provide preliminary real-time data on the suitability of using the 123 superconducting material and devices made from it in a space environment, and to point out at a early stage any deficiencies which may result from the tests. The deficiencies, if any, will be corrected and retested wherever possible.

The specific tests of primary concern are designed to critically evaluate the various materials (e.g. 123 ceramic, epoxy encapsulants, substrates and connectors) and devices made from them in an environment which simulates, as close as possible, the actual conditions in space. Accordingly, these include: 1) long-term stability in a high vacuum, 2) radiation damage due to high energy gamma rays, 3) degradation of properties as a result of thermal cycling and thermal shock, 4) mechanical stability due to vibration, 5) moisture sensitivity, and 6) loss of superconductivity due to exposure to magnetic fields.

In addition to the superconductor device produced at Clemson University, the Christopher Newport College Physics Department has developed and is optimizing a low-electric resistant joint material ($10^{-6}\Omega$) for use in connecting the ceramic superconductor into the circuit. Successful tests have been performed on typical specimens for thermal shock, moisture sensitivity, and mechanical strength.


Resistance (ohm)
0
1
2
3
4
5
6
0
50
100
150
200
250
300
Temperature (K)

NEGOTIATIONS WITH PRIVATE INDUSTRY FOR COMMERCIAL USE OF SUPERCONDUCTIVE MATERIALS AND DEVICES IN SPACE

- MOTOROLA INC., COMMUNICATIONS SECTOR, SHAMBURG, IL
- COORS' ELECTRONIC PACKAGING GROUP, CHATTANOOGA, TN
- WESTINGHOUSE, SAVANNAH RIVER CO., SC
- MAXWELL LABORATORIES, SAN DIEGO, CA
- AVX, INC., MYRTLE BEACH, SC
- EASTMAN KODAK CO, ROCHESTER, NY
- TRW, REDONDO BEACH, CA

Director's Discretionary Fund Progress Report (FY 1990)

"Response of Middle Atmosphere to Solar UV Variability"

Principal Investigator: G. M. Keating

Purpose of Investigation:

To establish response of middle atmosphere to solar UV variability related to the 27-day rotation period of the sun in order to determine, to good statistical accuracy, the nature and amplitude of solar forcing in the middle atmosphere. Knowing the response to 27-day solar variations to good statistical accuracy allows better estimates of the response of the atmosphere to 11-year solar variations which must be accurately known in order to isolate global anthropogenic effects.

DDF Initiation Year: FY 1990

DDF Funding Authorized for FY 1990: 75K R&D

DDF Aggregate Funding Authorized in FY 1989 and Earlier Years: None

Actual or Expected Expenditure of FY 1990 Funding:

In-House - 3K
Contracts - STX 72K
Grants - None

Status of Investigation at End of FY 1990:

To Be Continued in FY 1991
FY 1991 DDF, Funding Required - 80K
FY 1991 Partial OSSA Funding Expected - 25K (BDA-23-11-70)

Expected Completion Date - FY 1992

FY 1990 Accomplishments:

(1) Isolated response of total column ozone to short-term solar UV variability from study of Nimbus 7 TOMS ozone data and Nimbus 7 SBUV solar data.
(2) Near equator net ozone response times 3 to 4 days in accord with theory.
(3) However, the percent change in ozone per unit change in solar UV is a factor of 2 stronger than predicted.
(4) Also detected latitudinal/seasonal variations in total ozone/UV response where strongest responses were detected at high latitudes winter. This is contrary to theoretical predictions.
(5) The unexpectedly strong O_3 responses appear to be in accord with change between SAGE II (1984-85) and SAGE I (1979-1980) ozone data in the lower stratosphere.
(6) Isolated latitudinal/seasonal response of middle atmosphere temperatures to short-term solar forcing based on 4 years of the highest quality Nimbus 7 SAMS data.
(7) Unexpectedly long stratospheric response times were discovered throughout the summer hemisphere similar to response times discovered previously near equator.
(8) Even longer temperature response times were detected in the winter.
(9) Strongest stratospheric temperature responses are unexpectedly found in the winter hemisphere (somewhat similar to the total column ozone response).
(10) As opposed to the long temperature response times in the stratosphere, mesospheric response times are short.
(11) Contrary to theoretical models, maximum mesospheric response occurs globally near 70 km for all seasons.

Reports, Journal Articles, Other Publications:

Keating, G. M., C. Chen, and M. Hitchman: Recent results on response of middle atmosphere to short-term solar UV variations, Anales Geophysicae, 1990 Special Issue, 258, 1990. (Published)

Keating, G. M., M. C. Pitts, G. Brasseur: Recent detection of the response of the middle atmosphere to short-term solar ultraviolet variability, Ozone in the Atmosphere, 375, Deepak Publishing, 1989. (Published)

Keating, G. M. and C. Chen: The mesopheric response to short-term solar ultraviolet variability, MAP Handbook, 29, 67, 1989. (Published)

Keating, G. M. and C. Chen: Middle atmosphere change through solar forcing, invited paper presented at COSPAR Symposium on Global Change and Relevant Space Observations (The Hague, Netherlands, June, 1990), and accepted for publication in Advances in Space Research, 1990. (Accepted After Peer Review)

Summers, M. E., et al. (including G. M. Keating): A model study of the response of mesospheric ozone to short-term solar ultraviolet flux variations, J. Geophys. Res. (In Press), 1990. (Accepted After Peer Review)

Papers in Preparation for Professional Society Meetings:

Keating, G. M.: "Comparison between short-term and long-term solar UV forcing of the middle atmosphere. Invited paper to be presented at the 20th General Assembly of the IUGG (Vienna, Austria, August 11-24, 1991).

Awards Received:

Elected Chairperson of SCOSTEP's International STEP Project 5.2, "Effects of Short-Term Solar Variability in the Lower and Middle Atmosphere." SCOSTEP is part of the International Council of Scientific Unions. This international program should give this important discipline area more visibility.

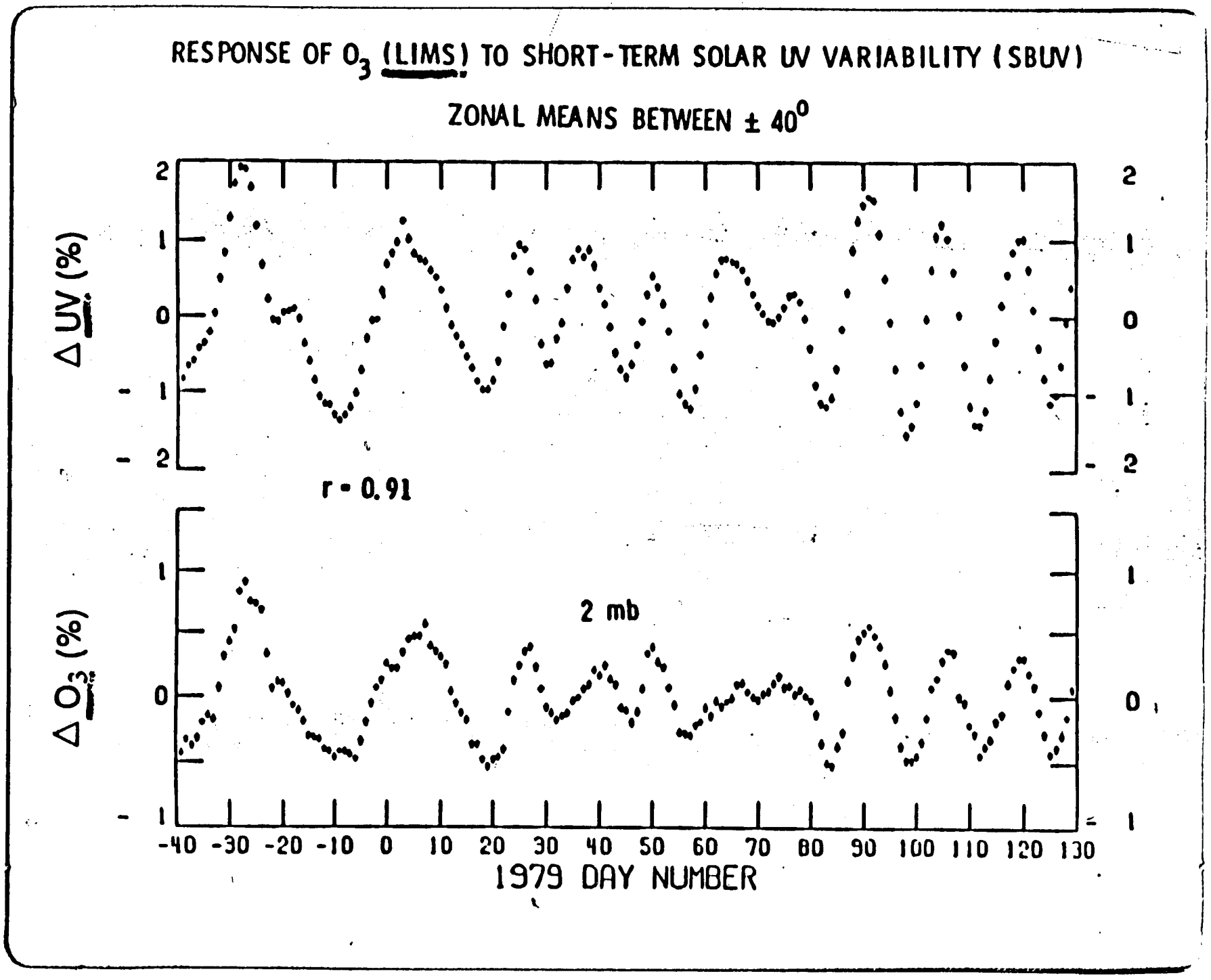
Planned Future Work (FY 1991):

(1) Study response of total column ozone to short-term solar UV variability for the present period of high solar activity using Nimbus 7 TOMS data and compare with results obtained previously for the last period of high solar activity near 1980.

(2) Initiate study with SSU data to isolate middle atmosphere temperature response to solar forcing. Study short-term response during high solar activity periods near 1980 and near 1989.

(3) Continue study of global response of mesospheric ozone to short-term solar $L\alpha$ variations using 1.27 micron Solar Mesospheric Explorer data. Compare mesospheric ozone/$L\alpha$ response resulting from HO_x chemistry with various estimates of water vapor climatology.

(4) Write article on global ozone/UV response on the 27-day and 11-year time scale describing how observations of the 27-day response allows good estimates of 11-year variations.


RESPONSE OF O_3 (LIMS) TO SHORT-TERM SOLAR UV VARIABILITY (SBUV)
ZONAL MEANS BETWEEN ± 40°
Δ UV (%)
r = 0.91
Δ O_3 (%)
2 mb
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130
1979 DAY NUMBER

1990 Director's Discretionary Fund Progress Report

Title: Noncontacting Steerable Infrared Flow Diagnostic Sensor

Project Leader: D. Michele Heath

Co-Investigators: William P. Winfree, Patricia Howell, Debra L. Carraway and David C. Davis

Purpose: The purpose of this project is to develop a noncontacting and quantitative technique for assessing flow parameters in wind tunnel environments. By radiatively injecting heat into the airfoil skins and monitoring the subsequent temperature decay, quantitative heat transfer coefficients can be imaged rapidly over large fields. Quantitative images of this nature can be used both as a diagnostic tool, e.g. to detect transition from laminar to turbulent flow, and as a research tool to refine and advance state of the art theoretical aerodynamic models.

Funding: The project was initiated in FY 1988 and was funded for $55K of FY88 funds and 65K of FY89 funds. The expected expenditure of FY90 funds is $55K. Of the $55K, $20K will be used for modelling and programming support, to be provided by Patricia Howellof Analytical Services and Mechanics. The remaining $35K will be used for procurement of a portable video digitizer and micro computer.

Status of Investigation: The investigation is ongoing and will be continued in FY91 with funds remaining from FY90. The project is expected to be completed in FY91.

FY 1990 Accomplishments: In FY90 an opportunity arose to implement the Infrared flow diagnostic sensor in the Basic Aerodynamic Research Tunnel (BART). An aluminum delta wing airfoil with a thin insulating surface coating was used. Extensive flow diagnostic studies have been done on the delta wing for comparison with the IR sensor measurements of turbulent transition. Wide range flash lamps were used to give a plane heat source which covers the entire airfoil. This allows global imaging of the whole airfoil at once. Also, a dedicated microcomputer and video digitizer borrowed from the NDE program, was used to allow on site processing. Preliminary measurements have detected a heat transfer effect at the expected position of turbulent transition. These results will be further characterized with currently ongoing measurements.

Future Work: Measurements are ongoing and will be performed at various angles of attack, and at various wind velocities. Direct comparisons will be made of the position of transition to those found with flow visualization techniques. Quantitative analysis also will be performed to compare the heat transfer coefficient values obtained to theoretical predictions.

1990 Director's Discretionary Fund Progress Report Summary

Title of Investigation: Aircraft Design and Optimization Using a Quasi-Procedural Knowledge-Based System

NASA Leader: James L. Rogers, Interdisciplinary Research Office, Structural Dynamics Division, Structures Directorate

Other In-House Members: James W. Fenbert, Vehicle Integration Branch. Advanced Vehicles Division, Aeronautics Directorate

Purpose of Investigation: Development of a new software architecture for aircraft synthesis and investigation of new optimization techniques using this system.

Aggregate Amount of Funding FY89 and Before: $50,000

Actual FY90 Funding:

In-house: None

Contracts: None

Grants: Dr. Ilan Kroo, principal investigator
Stanford University
Department of Aeronautics and Astronautics
$50,000 (discretionary funds)
$30,000 (Vehicle Integration Branch, Advanced Vehicles Division, Aeronautics Directorate)

Status of Investigation at End of FY90:

To be continued in FY91 with funds remaining from FY90

Transition to IRO RTOP for FY92, beginning October 1, 1990 if money available

Expected Completion Date: Current grant expires June 19, 1991

FY90 Accomplishments:

Reviews of this work were presented to the New Airplane Development Group at Boeing Commercial Airplane Company in March 1990 and at NASA Langley Research Center in April 1990.

The program was used in a graduate design course, resulting in improvements to the interface and the warning system.

Several analysis routines for aircraft synthesis were added.

The nonlinear simplex and variable metric optimization algorithms were integrated into the program.

Rules for knowledge-based optimization and preliminary design of transport aircraft were added to the knowledge base and the inference engine was improved.

Papers:

Paper submitted for publication to the AIAA Journal of Aircraft and is currently under review.

"Aircraft Design Optimization Using a Quasi-Procedural Method and Expert System" presented at the 3rd Air Force / NASA Symposium on Recent Advances in Multidisciplinary Analysis and Optimization, September 1990.

Final report received September 1990.

Planned Future Work:

Structural issues and decomposition:

- Selecting the best computational path from among several alternatives.
- Use of subpath sensitivities for for improved efficiency.

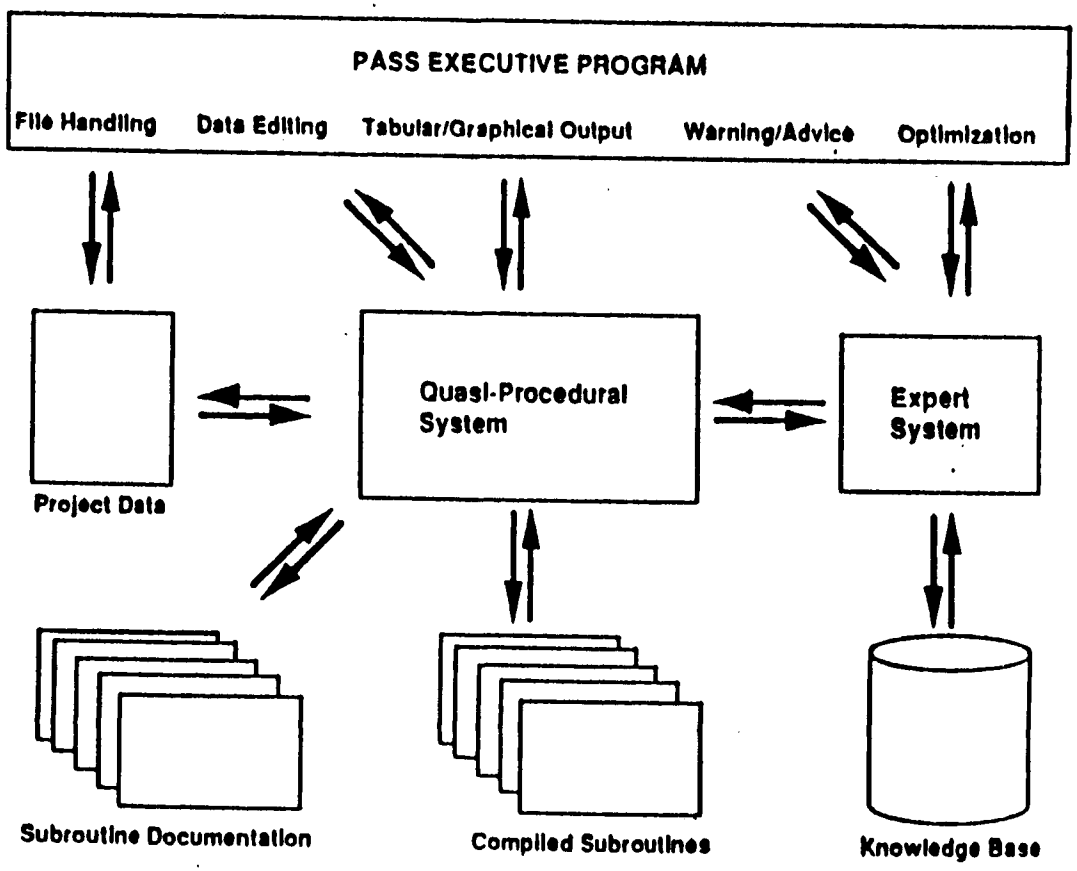
Optimization methodology:

- Selection of the optimization algorithm best suited for the quasi-procedural method.
- Improve the efficiency of optimization methods with the quasi-procedural method.
- Investigate the use of a genetic optimization algorithm.
- Investigate numerical and heuristic methods that can take advantage of redundant calculations in constraint bound problems.

Application and extension of the method:

- Extension of analysis methods for application to high speed civil transports.
- Extension of the knowledge base to include important high speed civil transport design rules.

Program for Aircraft Synthesis Studies (PASS)



FY 90 RESEARCH PROJECT SUMMARY

TITLE: Development of a Gauging System for Monitoring the Density/ Quantity of Slush Hydrogen

RESEARCH TEAM: Jag J. Singh (Leader), Chih-Ping Shen, and Danny R. Sprinkle

PURPOSE OF INVESTIGATION: Slush hydrogen is being considered as propellant for the National Aerospace Plane (NASP). It has low mass, high energy content, and lower volume than liquid hydrogen. However, no suitable technique is currently available for monitoring the quantity and flow rate of a fluid whose phase configuration is continuously changing. It was the purpose of this project to demonstrate the feasibility of a low energy gamma ray system for measuring the quantity (mass), and its rate of change, for such a fluid. Specifically, it was intended to demonstrate that mass attenuation coefficient of gamma rays in a medium is independent of the phase composition of the medium. This result would, in turn, serve as the basis for monitoring the quantity and flow rate of slush hydrogen on board the NASP.

INITIATION YEAR: FY 90

FUNDING AUTHORIZED: $50.5K

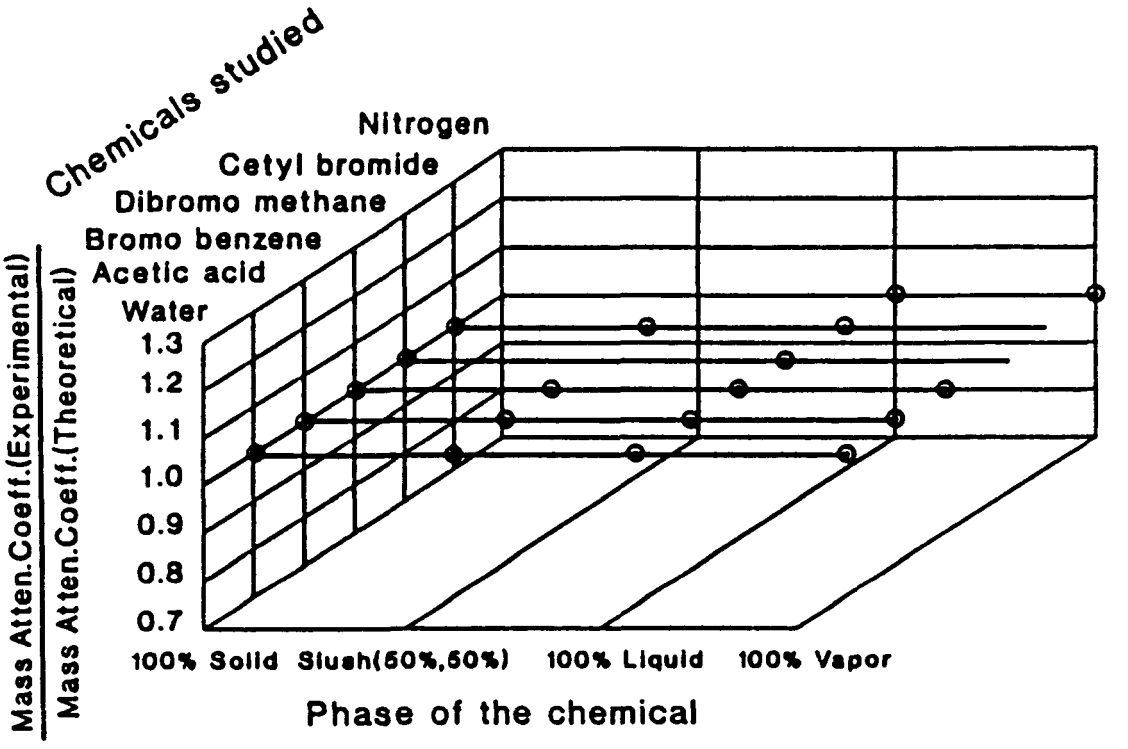
FY 90 EXPENDITURE: $10.5K (In-House R&D)
$40.0K (ODU Contract # NAS1-18584-72)

STATUS OF INVESTIGATION

AT THE END OF FY 90: Five chemical compounds (water, acetic acid, dibromomethane, bromobenzene, and cetyl bromide) were selected for measuring their mass attenuation coefficients in standard narrow beam geometry for Cd^{109} gamma rays. Measurements were made in gas, liquid, and solid phases separately, and in mixed phases. These measurements demonstrate that the mass attenuation coefficient for a gamma ray in any chemical compound is independent of its phase or phase fractions in the case of a multiphase mixture. The results are shown in the accompanying figure.

PLANNED STUDIES FOR FY 91: It is planned to extend the measurements to cryogenic fluids, such as slush nitrogen and slush hydrogen. Arrangements will be made to make these measurements at the National Institute of Standards and Technology (NIST) facilities in Boulder, Colorado. Funding at the level of $50.5K ($40K contract plus $10.5K in-house R&D) for FY 91 is hereby requested in order to complete the proposed studies.

EXPECTED COMPLETION DATE: December 31, 1991



SUMMARY OF MASS ATTENUATION COEFFICIENTS
IN CHEMICALS STUDIED

FY 90 ACCOMPLISHMENTS

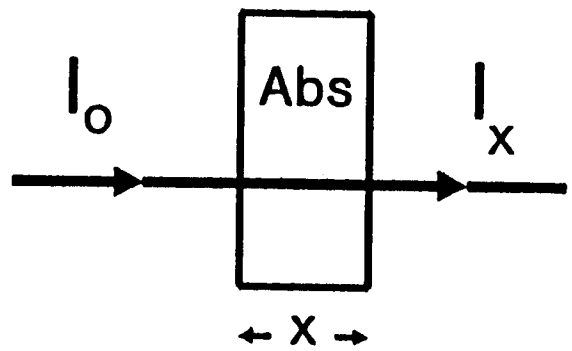
The initial results of the study were presented at the 36th International Instrumentation Symposium organized by the Instrument Society of America (ISA) and held at Denver, Colorado, in May 1990. A copy of the paper summarizing the results was also forwarded to the Manager, Cryogenic Technology at Martin Marietta Company, at his request. The results of multiphase studies completed to date are now being prepared for submission to Applied Radiation and Isotopes Journal.

PLANNED FUTURE WORK

After the completion of the projected FY 91 studies in mixed phase cryogenic fluids (SLN_2 and SLH_2), the results will be presented at an appropriate NASP symposium and published as a formal NASA report as well as a journal article.

PROPOSED TECHNIQUE

Nuclear Radiation Attenuation (NRA) :



$$I_x = I_o e^{-\mu x}$$

$$\mu\ (cm^{-1}) = \frac{1}{x} \ln\left(\frac{I_o}{I_x}\right)$$

= Linear Attenuation Coefficient

Results From DDF Proposal Entitled "Development of a Fully Coupled 2-D Photochemical-Transport Model of the Atmosphere

Linwood B. Callis and Robert E. Boughner
Atmospheric Sciences Division

Funding for this proposal ended in FY1989. The thrust of the proposal was the development of a 2–D photochemical-transport model of the atmosphere and the application of this model to a preliminary assessment of the effects of odd nitrogen ($NO_y = NO + NO_2 + NO_3 + HNO_3 + ClNO_3 + HNO_4 + 2 \times N_2O_5$) variations during the 1980s. These objectives were accomplished. Three papers have been submitted for publication to the *Journal of Geophysical Research* and two of these are currently in press. Three others are in preparation.

The atmospheric model has veen validated and has been used for several scientific investigations. Among these are the following:

(1) Assessment of the effects on global and tropospheric $O_3$of the annual presence of the Antarctic ozone hole during the months of September and October. Southern hemispheric tropospheric O_3 is significantly depleted. Global O_3 is depleted by $\approx 1\%$.

(2) Assessment of the effects of HSCT (High Speed Civil Transport) aircraft on global O_3 and NO_y. New results indicate that for future fleets, the most significant contributor to the perturbation of global O_3 will be the tropospheric subsonic fleet (not the supersonic fleet) which will cause tropospheric O_3 levels to rise significantly, especially in the northern hemisphere summer. Ozone increases caused by the tropospheric (subsonic) fleet more than offset the depletions caused by the stratospheric (supersonic) fleet. The combined fleet effects lead to small globally and annually averaged O_3 increases. The development of this result is attributed in part to a much improved tropospheric transport code which was incorporated into the atmospheric model and in part to significantly increased model resolution in the vertical (compared to other models). We believe that these results will be significant in the determination of the emission configurations and flight altitude of the subsonic and supersonic aircraft fleets during the period 2010-2015. A paper on these effects is in progress.

(3) Finally, results of model calculations and data analysis provide compelling evidence that the state of the middle atmosphere is strongly linked to the state of the magnetosphere and its variations with solar and geomagnetic activity. The results provide evidence for a previously unrecognized and large natural variation of global O_3. These results have been accepted for publication in the *Journal of Geophysical Research.*

ADVANCED IMAGE GATHERING/CODING TECHNOLOGIES

Friedrich O. Huck and Carl L. Fales
NASA Langley Research Center

Rachel Alter-Gartenberg
Old Dominion University

Zia-ur Rahman
Science and Technology Corporation

This investigation is concerned with the development of advanced image gathering/coding technologies. The goal is to combine image gathering with coding into a single device, thereby exploiting unique ways to improve the data compression and to reduce the electronics mass and power requirements. The mathematical approach is based on a rigorous extension of Shannon's information theory of communication to image gathering. The implementation utilizes two new technologies: (1) charge-domain processing on a monolithic charge-coupled device (CCD) detector, and (2) photon detection with asynchronous parallel processing (laminar photodetector/neural network).

This investigation was initiated in FY 1990 and will be continued in FY 1991. The DDF funding for FY 1990 was $70K to support Rachel Alter-Gartenberg through NASA contract NAS1-18584 with the Old Dominion University Research Foundation. The DDF funding for FY 1991 will be $70K to support Dr. Zia-ur Rahman through contract NAS1-18676 with Science and Technology Corporation. The funding for the development of the new technologies has come from the Small Business Innovative Research (SBIR) program.

The major current application is Mars rover imaging. The leader of this DDF investigation is the PI for defining the Mars rover imaging system (PIDDP #90-26). This system is expected to be a facility-type instrument that will serve numerous scientific investigations as well as the rover navigation. Code EL funding for this effort is starting in FY 1991. Additional applications are sought in other planetary missions, microgravity research and space station video, Earth Observer System (EOS) and other satellites.

The FY 1990 accomplishments include:

1. An end-to-end assessment of image gathering and coding for digital restoration. The conventional treatment of image gathering, coding, and restoration as separate tasks has led past designers to inferior performances despite the care and ingenuity that they have bestowed on the optimization of each stage. We have demonstrated that images can be restored with better quality and from less data as a result of the end-to-end optimization.

2. The rigorous extension of information theory to image gathering. This extension required a careful examination of the basic principles of information theory to obtain an unambiguous quantitative description of information and of optimal image restoration for undersampled systems. One of the results revealed a multiresponse image gathering

and restoration process that allows us to unscramble the within-passband and aliased signal components to restore spatial frequencies beyond the sampling passband, out to the spatial-frequency response cutoff of the optical aperture. We have demonstrated that this process allows us to reassemble from K multiresponse images a minimum mean square error image with a resolution that is $\sqrt{K}$ times finer than the photodetector-array sampling lattice.

Journal Articles:

C. L. Fales and F. O. Huck, "An Information Theory of Image Gathering," Information Sciences, December 1990, invited.

F. O. Huck, C. L. Fales, R. Alter-Gartenberg, and Z. Rahman, "Multiresponse Image Gathering and Wiener-Matrix Restoration," Journal of the Optical Society of America, in preparation.

Invited Presentation:

F. O. Huck, S. John, and S. Reichenbach, "Information Theoretical Assessment of Image Gathering and Coding for Digital Restoration," SPIE's Visual Communications and Image Processing '90, 1-4 October, Lausanne, Switzerland.

The FY 1991 goals are:

1. Continue the end-to-end optimization studies, using CCD sensor arrays with charge-domain processing to combine image gathering and coding. Image coding will include redundancy and irrelevancy reduction. Redundancy reduction is a reversible, informationally lossless procedure which is concerned solely with the statistical properties of the acquired image; irrelevancy reduction is an irreversible, informationally lossy procedure which is concerned mostly with the visual properties of the scene and the restored image. Irrelevancy reduction allows us to control the amount of data compression, beyond lossless compression, and the associated amount and type of image degradation.

2. Design, simulate, and evaluate an informationally optimized multiresolution image gathering/coding system using photon detection with asynchronous parallel processing. Image gathering and transmission would provide a continuously increasing resolution, starting with a resolution that is much coarser than the photodetector-array sampling lattice, and ending with a resolution that is much finer. Data compression would be achieved by transmitting the coded difference between successive images only after testing whether these differences will perceptually improve the resolution of the restored image. This test may be based on the variance of the difference images. Thus, the increase toward higher resolution could be terminated at any time, say, because the scene lacks significant detail or the detail is blurred.

Project Title: An Airborne System for Detecting and Sizing Ultrafine Atmospheric Aerosols

Investigators: Bruce E. Anderson and Gerald L. Gregory
Atmospheric Studies Branch, ASD

Participants: Charles Hudgins (OSD), Donald Bagwell (OSD), and Karen J. Leister (Data Management Office, ASD)

Purpose of Investigation: To develop instrumentation and sampling strategies for detecting and sizing 0.01- to 0.10-μm diameter atmospheric aerosols (ultrafine aerosols) from an aircraft platform. Particles in this size range are important in tropospheric heterogeneous chemical processes and cloud formation and can be used as tracers to indicate aerosol source regions. No spectrometer exists for real time continuous monitoring of ultrafine aerosols from aircraft. Major aspects of the investigation include (1) modifying commercial condensation nuclei counters (CNC's) to operate at reduced pressure; (2) characterizing the response of particle diffusion filter screens as a function of pressure, temperature, and flow rate; (3) developing an efficient aircraft aerosol sample inlet; and (4) developing data acquisition hardware and software.

Initiation Date and Funding Level: April 1990; $50,000

Actual or Expected F.Y. 1990 Expenditures: As of Oct. 1, 1990, $37.4 K of the $50.0 K funding had been committed as follows:

In-house expenses.....27.4 K
Contract to Research Triangle Institute.....10.0
for tests and calibration

Project Status at End of F.Y. 1990: (Completed in F.Y. 1990) Because of the project's late starting date, most of our time was spent establishing design specifications and purchasing equipment. Progress has been made in several key areas, however.

The proposed technique of detecting and sizing ultrafine aerosols with a battery of diffusion filters and a single CNC was abandoned in favor of a system of four CNC's, each with diffusion filters unique to a specific size range. This will allow simultaneous, continuous monitoring of four particle sizes in the range of interest. CNC's and a selection of diffusion filters have been ordered from a commercial vendor.

Operating a condensation nucleus counter (CNC) aboard an aircraft requires that its response be insensitive--or at least well characterized--to variations in pressure. Team members have modified the flow system of a laboratory CNC, replacing its critical flow orifices with a pressure-regulated valve to maintain constant volumetric sample flow through the instrument regardless of inlet pressure. Initial tests show the modified CNC operates with less than 20-percent loss in sensitivity to ambient aerosols down to 200-mmHg pressure.

Diffusion filter efficiency is also pressure dependent; as pressure is lowered, more particles diffuse to the filter surface, shifting its 50-percent cut-size to larger particle diameters. Fractional penetrations of 0.01- to 0.10-μm particles through various

thicknesses of diffusion filter screens were computed as a function of pressure, temperature, and sample flow rate. Results, verified when possible with experimental data, show that filter efficiencies can be calculated with good accuracy from measured environmental parameters and demonstrate that diffusion screens are a viable separation technique even at pressures as low as 100-mmHg.

Software for monitoring and displaying the counts from up to four CNC's has been completed and tested. The package also reads eight channels of analog data such as pressure, temperature, etc.; thus CNC and diffusion filter responses can be corrected for sample density and flow rate variations in real time.

Because Langley presently lacks the necessary facilities, we have contracted Research Triangle Institute (RTI) to perform initial tests and calibrations on both the CNC's and diffusion particle filters. RTI will determine the devices' sensitivity to various sized particles as a function of pressure, temperature, and sample flow rate. This contract was let in F.Y. 1990 with work scheduled to begin in early F.Y. 1991.

(To be continued in F.Y. 1991) The remainder of the F.Y. 1990 funding will be used to fabricate an aircraft aerosol sample inlet and to purchase an aerosol generator, a first step toward establishing laboratory calibration capability at Langley. The aerosol sample inlet will be designed and built in-house and its efficiency tested in a wind tunnel. Initially, the design goal will be to minimize turbulence within the probe; once a CNC is satisfactorily calibrated, the probe design will be fine-tuned by measuring its particle transmission as a function of velocity.

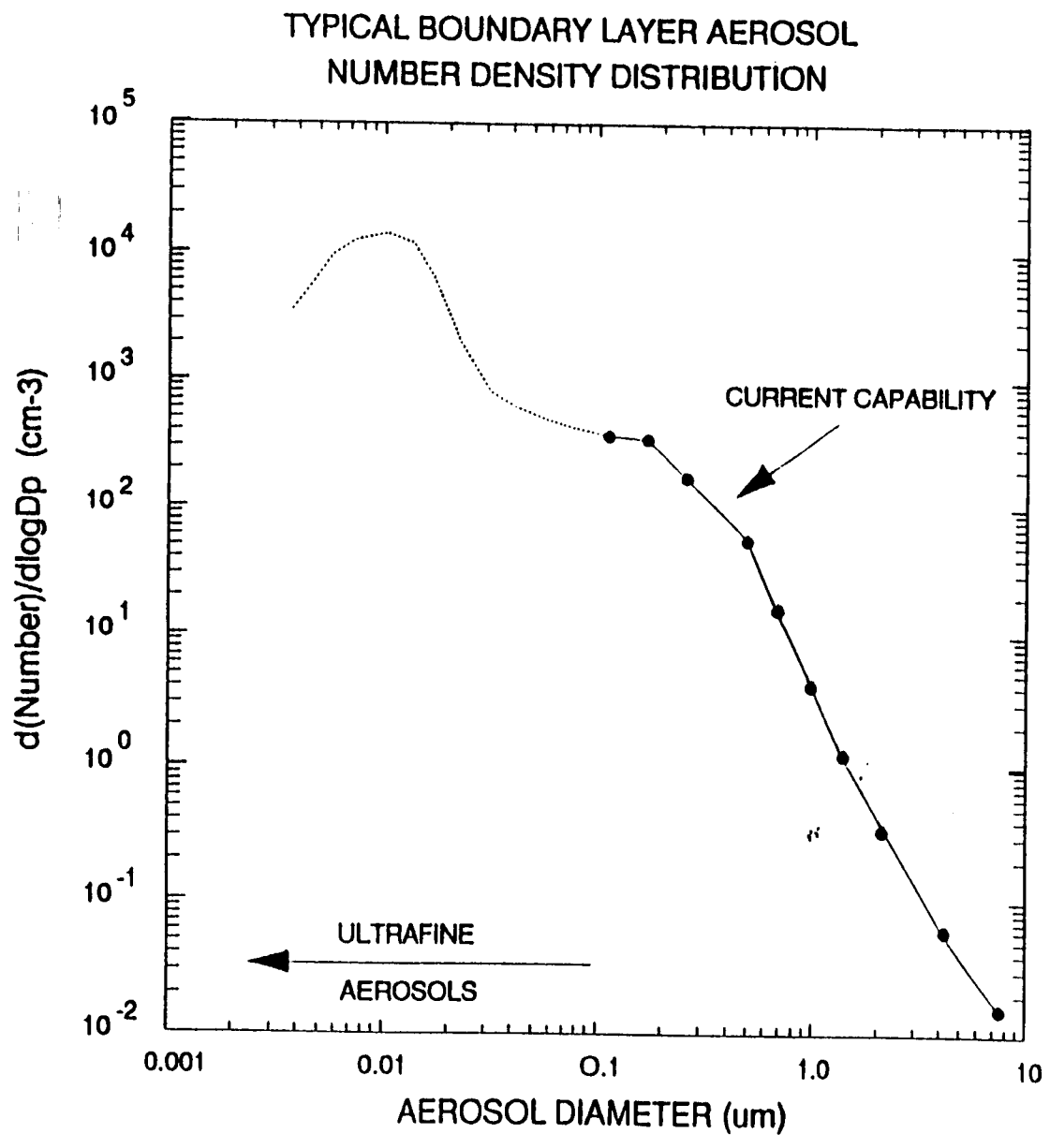
A prototype version of the aerosol spectrometer will be assembled and flight tested during spring 1991. Performance of the system will be examined relative to airstream pressure, temperature, and water vapor content and the aircraft roll, pitch, and true air speed. These results will guide further instrument refinements.

We request $40,000 additional F.Y. 1991 funding. This money will be used to purchase a laboratory grade ultrafine aerosol size spectrometer which will allow us to further characterize the aircraft aerosol spectrometer system and to perform routine calibrations prior to field missions.

Expected Completion Date: December 1991

F.Y. 1990 Accomplishments: Because of the project's late starting date, reports and papers detailing project accomplishments will be forthcoming in F.Y. 1991 and 1992.

Planned Future Work: During F.Y. 1991, a prototype version of the aerosol spectrometer will be tested on flights aboard the Wallops Electra during a scheduled mission. The system will be refined according to these test results and, with project permission, flown as part of Langley's array of aerosol sampling sensors aboard the NASA/Ames DC-8 during the NASA/Global Tropospheric Experiment Pacific Exploratory Mission (PEM-West) in summer 1991; we anticipate the new spectrometer system will be quite useful in this project for aging air masses and elucidating the role of aerosols in the tropospheric sulfur cycle.


TYPICAL BOUNDARY LAYER AEROSOL
NUMBER DENSITY DISTRIBUTION
d(Number)/dlogDp (cm-3)
10^5
10^4
10^3
10^2
10^1
10^0
10^-1
10^-2
CURRENT CAPABILITY
ULTRAFINE
AEROSOLS
0.001
0.01
0.1
1.0
10
AEROSOL DIAMETER (um)

TITLE: Vortex Enhancement of Supersonic Mixing

LEADER: Gary Settles, Penn State University

PURPOSE: Investigate the use of vortical flow to enhance mixing in supersonic combustion ramjets.

INITIATION YEAR: 1988 (Has been funded 3 years)

FUNDING LEVEL: $75K per year

FY 90 FUNDING: $75K

FY 90 GRANT: $75K

STATUS: Penn State has been notified that 3 years was it. Don't expect DDF funding for more than 3 years, not enough generic hypersonic funds to continue.

EXPECTED COMPLETION DATE: Work will not be completed until next October. Grant funds will not last that long.

ACCOMPLISHMENTS: During the past year the swirl injector was redesigned and constructed. The purpose of the redesign was to increase the scale, increase the swirl and reduce the effect of the mounting strut on the tunnel flow down stream of the injector. Contoured turning vanes were used to replace the straight vanes on the previous design. Planer Mie scattering visualizations of the vortex flow have been conducted with the new injector. Also five hole probe data have been taken to document the swirl. Both instantaneous and time averaged images of the laser sheets have been taken. Results to date indicate some slight mixing enhancement due to the vortical flow, but the results are far below what would be required to make the system practical as an injector for a scramjet combustor. A drawing of the new injector is attached. AIAA Paper 89-2456 documented the results to date.

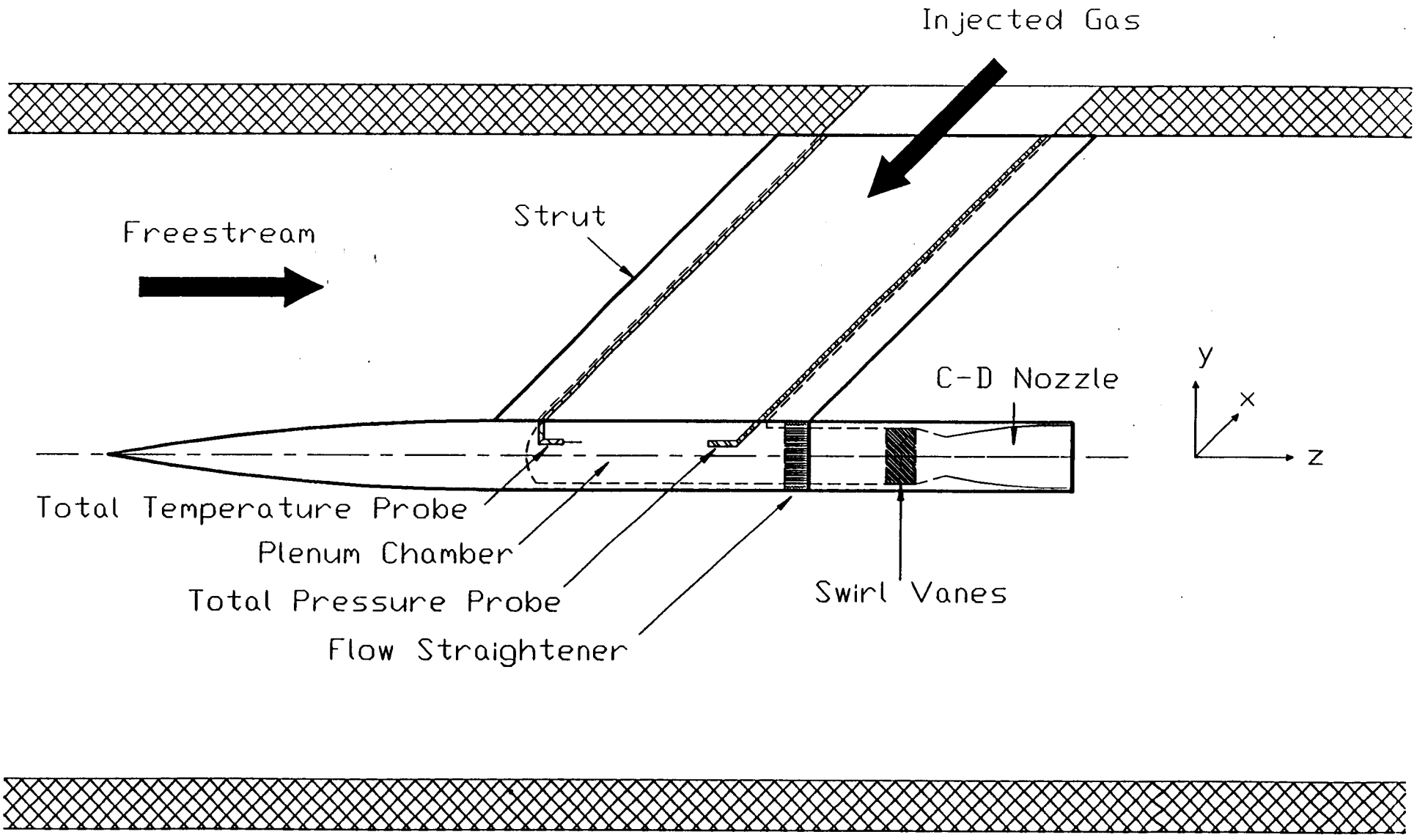


DIAGRAM OF VORTEX INJECTOR INSTALLED IN WIND TUNNEL TEST SECTION

PENNSTATE Gas Dynamics Laboratory

newinj.dwg

Director's Discretionary Fund Progress Report

Title: Fault-Tolerant Neural Networks for Flight Control Systems

Leader:
Daniel L. Palumbo. ISD SVMB/130

Other In-House Members:
Peter Protzel. ICASE/132C
Pete Pidilla ISD SVMB/130

Initiation Year: 1989

Purpose of Investigation: To determine fault tolerance characteristics of neural networks with emphasis on those capable of flight system control.

Aggregate Funding for 1989 and Earlier: $78,000

Funding Authorized for 1990: $55,000

Actual Expenditures for 1990: $55,000 for ICASE researcher and William and Mary grad student

Status of Investigations at end of FY 1990:

Completed in FY 1990

1. Have modeled several neural network applications including a task scheduler for a fault tolerant computer.
2. Have evaluated the fault tolerance of these neural networks.
3. Have investigated applying Probabilistic Neural Networks (PNN) to flight control.
4. Have concluded that the PNN is not suited to flight control due to extremely large memory requirements.

To Be Continued in FY 1991

With Funds Remaining from FY 1990:

1. Publish Technical Paper and journal report.
2. Begin investigation of Self Organizing Maps (SOM) to determine fault tolerance. This work is to be based on results of AMES research in neural network robotics control.
3. Investigate SOM applicability to flight control problem.

With Additional FY 1991 Funds: $55,000

1. Investigate enhancements to SOM model which would increase fault tolerance. Evaluate enhanced model.
2. Investigate architectural issues of implementing SOM networks while retaining fault tolerant attributes of models.
3. Evaluate SOM flight control network.

Expected Completion Date: Expect Completion at end FY 1991.

FY 1990 Accomplishments:

Technical Reports/Journal Papers

P. Protzel, D. Palumbo, and M. Arras, "Fault-Tolerance of a Neural Network Solving the Traveling Salesman Problem", ICASE Report No. 89--12/ NASA Contractor Report 181798, ICASE / NASA Langley Research Center, Feb. 1989, 14p.

D. Palumbo, P. Protzel, and M. Arras, "Fault-Tolerance of Artificial Neural Networks and Applications in Critical Systems", NASA TP [in preparation].

P. Protzel, D. Palumbo, and M. Arras, "Performance and Fault-Tolerance of Neural Networks for Optimization", [to be submitted to IEEE Transactions on Neural Networks].

Conference Proceedings

P. Protzel, "Comparative Performance Measure for Neural Networks Solving Optimization Problems", Proc. of the International Joint Conference on Neural Networks IJCNN-90, Washington D.C., January 1990, pp. II-523-526.

P. Protzel and M. Arras, "Fault-Tolerance of Optimization Networks: Treating Faults as Additional Constraints", Proc. of the International Joint Conference on Neural Networks IJCNN-90, Washington D.C., January 1990, pp. I-455-458.

P. Protzel, "Artificial Neural Network for Real-Time Task Allocation in Fault-Tolerant, Distributed Processing System", In Parallel Processing in Neural Systems and Computers, R. Eckmiller, G. Hartmann, and G. Hauske (Eds.), Elsevier Science Publishing Company, Inc., 1990, pp. 307-310.

Presentations

Jan 90 International Joint Conference on Neural Networks, Washington, D.C. 1 oral presentation, 1 poster presentation

Feb 90 Workshop for Neural Networks: Academic/Industrial/NASA/Defense, Auburn University, AL. 1 oral presentation.

Mar 90 International Conference on Parallel Processing in Neural Systems and Computers, Duesseldorf, West-Germany, 1 oral presentation

Apr 90 First Annual Conference on Applications of Artificial Neural Networks, Orlando, Fl. 1 oral presentation

Additional Accomplishments:

1. Investigated unique neural network architecture termed a High Order Associative Memory.

Technical Papers

P. Protzel and C. Jeffries, "High Order Associative Memory", [in preparation].

Conference Proceedings

C. Jeffries and P. Protzel, "High Order Neural Models for Error Correcting Code", SPIE Proceedings Vol. 1294, Applications of Artificial Neural Networks, Orlando, Fl, April 1990, pp. 510-517.

Daniel L. Palumbo
46185

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia
23665-5225

NASA

Reply to Attn of 432

September 24, 1990

TO: 105A/Chief Scientist

FROM: 432/Aerospace Technologist, Model Engineering Section, ASEB, SED

SUBJECT: 1990 Director's Discretionary Fund (DDF) Progress Report

Title of Investigation - Multiple Plate Methods Application to the Design and Fabrication of Highly Complex, Instrumented Wind Tunnel Models

Leader or Leaders - Barry Gibbens, SED

Other In-House Members of Team - Vance A. Overbay - SED
Danny Barrows - FD
Roger Martin - FD
Pierce Lawing - AAD
William L. Sellers, III - FLD MD
Michael L. Kelly - FD
Michael S. Dashiell - FD

Purpose of Investigation - The purpose of this investigation is to develop multiple plate technology to the extent that it can be used routinely in the design and fabrication of highly complex instrumented models which require numerous orifices in very thin airfoils of complex shape, and for other applications such as active cooling.

Initiation Year - 1989

Funding Authorized - August 1989 in the amount of $30,000
January 1990 in the amount of $50,000

Expected Expenditure of 1990 Funding

In-House - $25,000
Contracts - $5,000
Grants - None

Status of Investigation at End of FY 1990

1. Model surface geometry has been developed and installed on the Engineering CAD system (ANVIL-5000) for design layout, and FldMD has defined their desired orifice locations.

2. All necessary fabrication hardware has been procured.

3. A tutorial class was procured to bring all fabrication team members up to speed in the utilization of a digitally programmable vacuum braze furnace.

4. Sample specimens have been used to demonstrate in-house chemical etching capabilities.

5. Etched, laminated, and brazed specimens have been fabricated in order to demonstrate in-house capability equal to or better than technology previously developed under contract.

6. Testing has been done on various laminated braze specimens for the purpose of optimizing braze foil thickness, temperature, and distributed load during furnace brazing.

7. Fixtures have been developed for the purpose of improving the method of load distribution on brazed stack specimens, using methods such as vacuum bag enveloping and steel shot loading.

8. A fixture has been developed for brazing lap shear specimens, to utilize pressures and procedures developed in previous testing.

9. Specimen fabrication and testing has shown significant improvements in etching and brazing capability over previous work done early in the program.

10. Channel layout plate design for the F-18 vertical tail has been completed.

Activities to be Continued in FY 1991

1. Fabrication of the F-18 Vertical Tail for testing in the B.A.R.T. facility.

2. Expansion of the proof-of-concept test article from the tail only to both the wing and tail, representing a major change in scope for the program.

3. Publication of a NASA T.M. demonstrating accomplishments to date, in-house capabilities, and the state-of-the-art in multiple plate technology as applied to wind tunnel model fabrication.

4. Scale up to larger specimens representative of 3-D models.

Additional Funding Requested for 1991 is as follows: No additional funding should be required over that which will be transitioned from 1990 to 1991.

Transition to other funding - Continuance of this technology will rely on the remainder of its DDF funding with the possible addition of some base R&D funding.

Expected Completion Date - 3rd quarter of 1991

FY 1990 Accomplishments - Improved the state-of-the-art of multiple plate brazing capabilities, while transitioning the work to in-house, thus developing in-house fabrication capabilities.

Planned Future Work - As covered under 1991 activities.

Barry V. Gibbens
47141

cc:
112/SE&O
430/SED
432/MoES Files.
Barry V. Gibbens
432/BVGibbens:cdj 9/24/90 (47111)

432/CEC CEC

432/ELK ELK

430/RJM/RMB RMB

112/RLS RLS 10/22/90

Quadrature Mirror Filtering Image Coding : Focal Plane Processing of Images

Daniel Jobson and Richard Samms

Investigate the Quadrature Mirror Filter and related issues, including Sketch-base Coding, for image data encoding and data management with respect to space mission imaging systems.

Initiation Year	: FY1989.
FY1989 and Previous Funding	: $ 52,000.
Funding Authorized for FY1990	: $ 60,000.
Expenditure of FY1990 Funds	: $ 2,000 in house. $ 58,000 contract to Daniel H. Wagner Associates.
Status of Investigation FY1990 End	: Six months into second year's effort, remainder to be funded by FY1990 funds.
Expected Completion Date	: March 1991.
FY1990 Accomplishments	: "A Discrepancy within Primate Spatial Vision and its Bearing on the Definition of Edge Detection Processes in Machine Vision." by D. Jobson, approved for publication as NASA TM 102739. "Least Mean-Squared Error Quadrature Mirror Filter Design" by R. Samms, submitted to IEEE Trans. ASSP. "Visual Recognition and Scene Rendering from Minimal Image Information", and "Small Kernel Quadrature Mirror Filter Design", in preparation.

- Quadrature Mirror Filters
  - Analysis of the 2D QMF in the frequency domain
  - Statement of the small kernel spatial domain problem
  - Identification specific kernels from primate vision
- Sketch-based Coding
  - Established character of sketch-bearing channels
  - Preliminary definition of image rendering process
  - Identification of minimal information channels

Planned Future Work :

- Quadrature Mirror Filters
  - Analysis of primate vision kernels in the QMF
  - Couple Sketch-based coding to QMF interpolation
- Sketch-based Coding
  - Relate modes of recognition to scene properties
  - Additional study of sketch extraction processing

Quadrature Mirror Filtering Image Coding : Focal Plane Processing of Images

Accomplishments in fiscal year 1990, including the preparation of reports and publications, has centered about the design of the QMF decimation and interpolation kernels in the 2D sampled spatial domain. Since it is an intention of this study that the process be applicable to a hardware implementation directly in the focal plane of an imaging instrument, a major issue will be the limitations on the interconnection of the sampling elements of the device itself. This requirement forces the design of the kernels in the decimation channels to be small in spatial extent, ie 3x3, 5x5 etc. Designing the interpolation kernels for a LMSE fit to such small decimation kernels in the spatial frequency domain leaves much to be desired. The use of the Discrete Fourier Transforms on such small kernels introduces errors in and of itself and is therefor precluded. Thus, a sampled spatial domain approach is warranted.

It can be shown that with the assumption of separable kernels, ie. $h(n,m) = f(n)g(m)$, then the result of decimation on a finite 2D sample set can be written as a general matrix equation,

$$\mathbf{y}_i = \mathbf{A}_i \, \mathbf{x} \, \mathbf{B}_i,$$

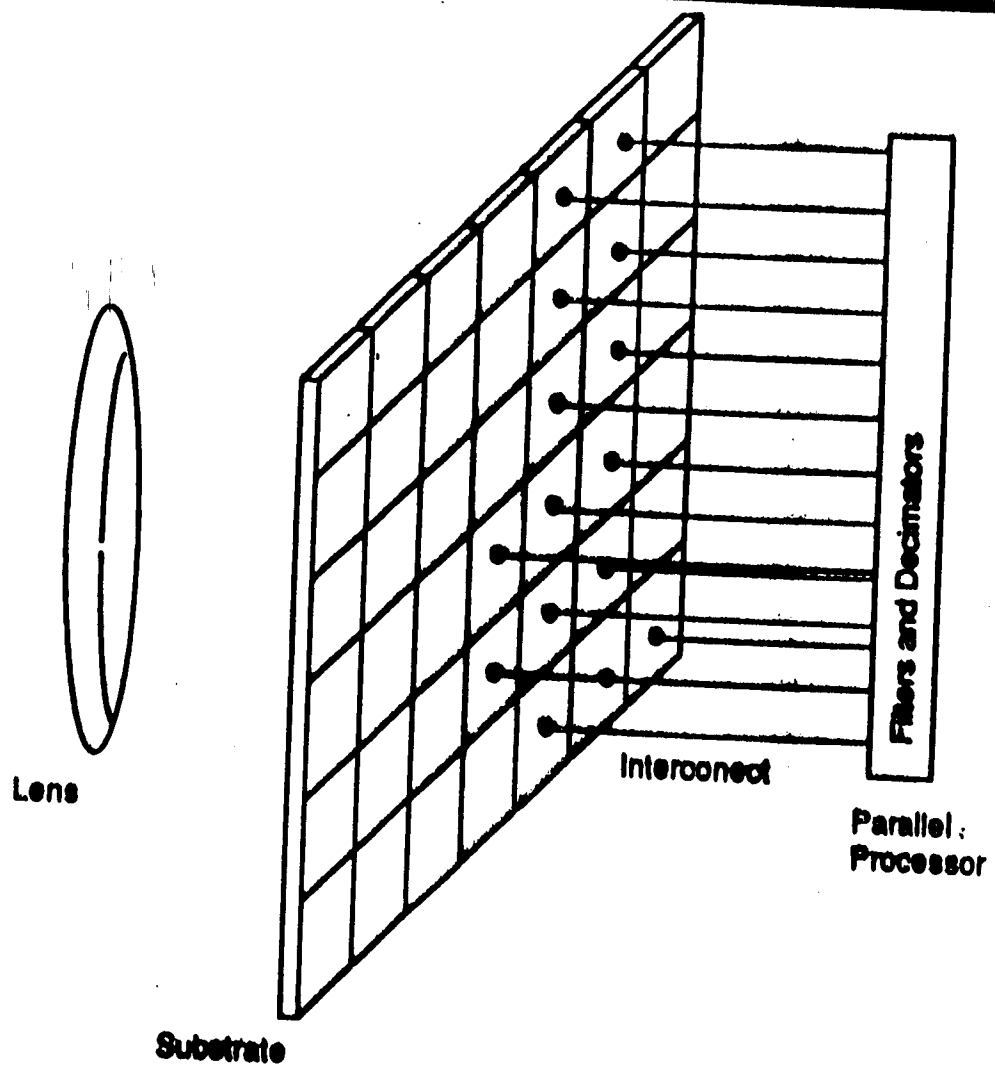
where $\mathbf{y}_i$ is the rxr decimated image from the ith channel, $\mathbf{x}$ is the original nxn image ($r < n$), and $\mathbf{A}_i$ and $\mathbf{B}_i$ are sized accordingly. The matrices $\mathbf{A}_i$ and $\mathbf{B}_i$ are circulant, and in the case of small kernel sizes, mostly sparse. To invert the process of decimation, one must determine a set of non-square circulant matrices, $\{\mathbf{C}_i, \mathbf{D}_i\}$ such that

$$\mathbf{x} = \sum_i \mathbf{C}_i \, \mathbf{y}_i \, \mathbf{D}_i.$$

Investigations into the properties of circulant matrices and LMSE solution to the above equation when each of the decimated images are also corrupted by zero mean additive noises is of priority in the current effort. Future efforts in small kernel design will include the use of decimation kernels that produce results congruent with physiological studies of the primate visual system and the inverse processing required when the decimated data are encoded using Sketch-based methods. These physiologically congruent kernels are omni-directional in design and hence deviate from the more traditional extensions of the QMF to 2D signals.

The essence of Sketch-based coding is to build a core of coded image data from the most perceptually significant image phenomena - namely the skeletal sketch of the image structure. From this core, image reconstruction works outward to flesh out an accurate or at least an informative rendition. Previous work has not clearly defined the exact nature of the processing required to extract sketch information from arbitrary images. During FY1990 image operators were defined by edge detection studies. Oriented or directional operators were ruled out because of unresolvable ambiguities of edge extent. These ambiguities arose from the positional uncertainties

along the oriented axes and the confounding of edge contrasts with edge extent. Further, a review of primate vision studies for oriented response neurons places that response in a spatial frequency range that is not consistent with the perception of the primary structure in images. For this reason, the kernels for a QMF processor with channel responses that mimic the omni-directional primate responses have been selected to be 3 circularly symmetric highpass and a single circularly symmetric lowpass kernel. Two of the highpass kernels are complementary in terms of contrast sensitivity and spatial resolution, and are designed to provide data for edge detection. The third highpass kernel is for mathematical completeness in a QMF processor. The lowpass channel is designed to provide a heavily decimated set of lightness values which when coupled with the edge data provides the image rendering. Future efforts will be concerned with the modes of visual recognition and satisfying the information requirements for these modes with as little transmitted data as possible.



Focal Plane Processing

Computational Fluid Dynamic Modeling of MOCVD of III-V Materials with Experimental Verification

Ivan O. Clark and William A. Jesser
(Linda R. Black, UVA at LaRC)

Purpose:	Investigate CFD and LV modeling of InP growth by MOCVD and the correction of thermal gradient effects on LV measurements.
Initiation Year:	FY 1990
FY 1990 Funding Authorized:	$60,000. / 0.2 MY CS / 0.5 MY FAB / 100K CRU's
FY 1990 Funds Expenditure:	$7,000. in-house / $53,000. grant with UVA
Status of Investigation FY 1990 End:	6 months into first year's effort, continuing under FY 1990 funds. Additional FY 1991 Funding to be requested for second year (estimated $66,000.).
Expected Completion Date:	April 1992
FY 1990 Accomplishments:	InP has been grown on fused silica substrates using trimethylindium and phosphine precursors. Techniques to measure film thickness and composition are being refined. A non-linear rectilinear grid has been fitted to the reactor geometry and CFD modeling of InP deposition has begun.
Planned Future Work:	InP growth rate and composition will be determined as a function of pressure and nominal flow velocity. A duplicate MOCVD reactor flow channel will be characterized with LV measurements using non-reacting gases. CFD model results will be compared with MOCVD deposition thickness as a function of pressure and flow velocity and with LV flow measurements.

Computational Fluid Dynamic Modeling of MOCVD of III-V Materials with Experimental Verification

Ivan O. Clark and William A. Jesser

During the first six months of this effort, the indium phosphide (InP) growth and computational fluid dynamic (CFD) modeling phases of the research have begun and engineering drawings for the laser velocimetry (LV) test chamber have been developed.

The metalorganic chemical vapor deposition (MOCVD) InP growth studies are performed at UVA and the CFD and LV studies are conducted at LaRC. Previous growth studies at UVA had focused on GaAs and GaAlAs. The transition to InP research was carried out in 2 steps. First, the operation of the trimethylindium (TMI) source was verified through the growth of InGaAs. Resulting films indicated that the TMI source and the associated supply system was functional and uncontaminated. Second, InP growth was attempted with TMI and phosphine (PH_3) precursors. Using growth conditions similar to those used for InGaAs, initial attempts to grow InP on fused silica substrates were unsuccessful. When a GaAs substrate was used, a layer of InP was produced but the quality of the layer appeared to be poor. A fresh review of the literature suggested that successful growth of InP required a much higher ratio of Group V to Group III precursor (PH_3 to TMI) than was required for growth of the arsenides and that a low temperature initiation stage might be required. By implementing both of these approaches, InP has now been successsfully grown on fused silica substrates in this effort. As shown in fig. 1, measurements of the growth thickness along the nominal flow direction show 2 peaks prior to a relatively flat plateau. These peaks would seem to be consistant with measurements performed by Buchanan *et al.*(1) showing 2 different reaction mechanisms for the formation of InP from TMI and PH_3: one at low temperature and one at high temperature.

Initial interpretation of the growth data suggests that the first deposition peak arises from the low-temperature reaction mechanism, the plateau results from the high-temperature mechanism, and the intermediate peak results from a zone in which both mechanisms contribute to the growth. The deposition thickness is measured with a profilometer along the sides of channels etched in the grown layer. Efforts are currently underway to improve the accuracy and speed of this measurement technique so that a more refined grid of thickness measurements can be obtained. Studies have also begun to measure the composition of the grown layers as a function of position using a scaning electron microscope.

The CFD modeling of the process has begun. Both 2-D and 3-D non-linear grids have been developed to model the MOCVD flow channel and deposition zone. The results of the experimental growth indicate that it is necessary to treat multiple gas

and surface chemical reactions rather than an effective surface reaction rate as is commonly done when modeling GaAs deposition. Initial CFD studies are focusing on adjusting the various chemical reaction rates in the 2-D model in an attempt to obtain the multi-peaked deposition pattern. Where available, reaction rates from the literature are being used, but pre-exponential factors for the Arrhenius reaction rates have not been determined for most of the pertinent reactions and the published exponential factors generally have large uncertainties. Studies of the 3-D flow patterns for non-reacting flow are also underway for comparison with LV measurements.

Engineering drawings for the laser velocimetry test chamber have been developed. It is anticipated that LV measurements will begin shortly after the fabrication of the flow channel is complete.

Future work will include determining the InP growth rate and composition as a function of pressure and nominal flow velocity. Additional work may also be required to optimize the PH_3 to TMI ratio. Once appropriate chemical reaction rates have been determined for the CFD, a full 3-D model will be tested including thermodiffusion effects on species distribution and flow. Results of the CFD study will be compared with the experimental growth data and with LV measurments.

References

(1) N. I. Buchanan, C. A. Larsen and G. B. Stringfellow, "A Mass Spectrometric Study of the Simultaneous Reaction Mechanism of TMIn and PH_3 to Grow InP", J. of Crystal Growth 92 (1988) 605-615.

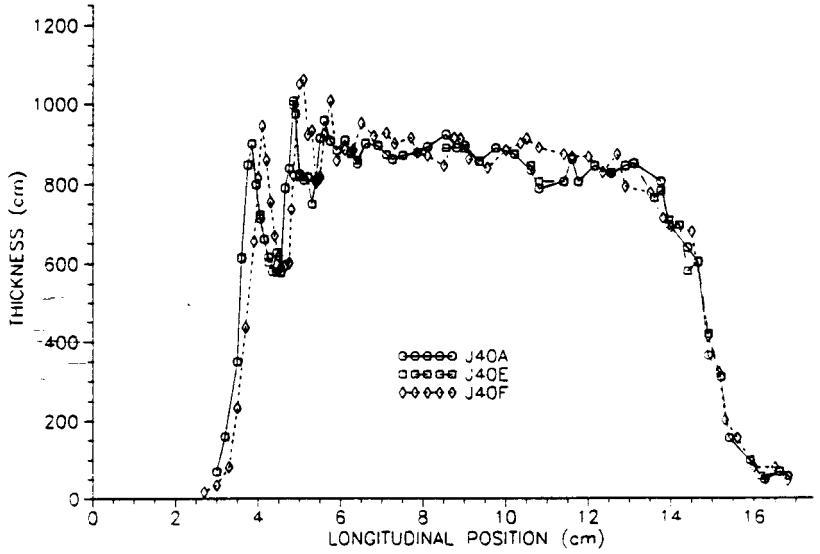


Figure 1. Indium phosphide layer thickness versus longitudinal position in the nominal flow direction. Curve A is along the centerline. Curves E and F are midway between the centerline and the outer edge of the substrate in each direction.

RESEARCH ON 2-MICRON WINDSHEAR AVOIDANCE LASERS

DDF PROGRESS REPORT (1990)

GLENN TAYLOR
Flight Electronics Division
ROLAND BOWLES
Flight Management Division
MARK STORM
ST Systems Corporation

PURPOSE OF INVESTIGATION:

To develop a 2 micron laser useful for detecting windshear. Experimental studies include the design and building of 2 micron lasers and performing basic spectroscopic measurements on laser crystals.

INITIATION YEAR: April 1988

RESOURCES: $25K , FY'88; $55K, FY '89; $80K FY'90 [Recieved March 1990]

EXPECTED COMPLETION DATE: July 1991

ACCOMPLISHMENTS:

The highlights for our 2-micron research activity include several "first" demonstrations for any 2-micron laser. Heterodyne detection at 2.09 microns was demonstrated for the first time. Laser measurements on the single-frequency Ho:Tm:YAG laser, developed in 1989, has demonstrated efficient, near quantum limited, performance. Lasing has been demonstrated in a new crystal, pure Tm:YAG, which operates efficiently at room-temperature without active cooling. It's expected that this crystal will enable efficient, pulsed operation. Injection control experiments are in the planning stage which will demonstrate room -temperature performance featuring coherent operation of a pulsed 2 -micron laser. These results have been achieved in spite of the funding glitch between October 1989 to March 1990 when the 3rd year DDF funding was approved.

Laser measurements on the newly demonstrated CW, single-frequency Ho:Tm:YAG laser has demonstrated a 68% conversion efficiency when operated at -30 Celcius. This internal efficiency closely approaches the maximum theoretical efficiency of 76%. Laser experiments at higher temperature significantly reduces this efficiency as a result of upconversion.

A 2-micron heterodyne detection package has been developed and demonstrated for the first time. Heterodyne detection is critical for windshear because it measures the frequency shifted laser light caused by

the Doppler effect. [This is in contrast to most detectors which measure the intensity of the light.] The very essence of the coherent detection technique is to measure the frequency shift laser light which backscaters off of moving particles inside the windshear.

Lasing has been demonstrated for a new crystal of pure Thulium YAG. Recent experiments have shown room-temperature, CW laser performance with 18 mW of optical laser power and high conversion efficiency. The significance of this new crystal is that efficient, Q-switched performance might be possible at room-temperature. The Holmium lasers currently under development would probably operate at -30 Celcius.

Injection control experiments of a flashlamp pumped, Q-switched, Ho:Tm:YAG laser is currently in the planning stage. This laser study will verify that it's possible to generate a single-frequency Q-switched laser using the injection locking technique. Single-frequency lasing is necessary for coherent lidar to work.

CONCLUSIONS:

Although tremendous progress has been made toward developing a coherent 2 micron transmitter, there are still some technical questions of a fundamental nature. Laser research activities will continue through July 1991 in order to address these issues.

PUBLICATIONS:

1.0 Mark E. Storm and Wayne W. Rohrbach,"Single-Longitudinal-Mode lasing of Ho:Tm:YAG at 2.091 microns," published Appl. Opt.,28,23,December 1989

2.0 Mark E. Storm, Grady J. Koch and Wayne W. Rohrbach," Single-Mode Lasing of Ho:Tm:YAG at 2.091 Microns in a Monolithic Crystal," published in the OSA Proceeding on Advanced Solid State Lasers, Optical Society of America, 1990.

3.0 Mark E. Storm and Wayne W. Rohrbach "Single-Mode Lasing of 2 Micron Lasers for Coherent Applications," presented at the 10th International Geoscience and Remote Sensing Symposium [IGARSS'90], sponsored be IEEE, College Park,Md., May 1990

4.0 Mark E. Storm, Grady J. Koch and Wayne W. Rohrbach," Miniature 2-micron Laser for Coherent Applications," submitted to Optics Letters, Sept., 1990

5.0 Mark E. Storm,"Status of 2-Micron Laser Technology Program," presented to the Third Combined Manufacturers' and Technologists' Airborne Wind Shear Review Meeting," Hampton, Va., Oct. 17,1990

Project Title:
New Interaction Theory of Vorticity-Dilation Field and Solid Body for Compressible Flow

Project Leader:
Elwood Putnam

Purpose:
The basic new idea underlying this project is based on the following observation: any interactions between a fluid element and its surrounding field, or between fluid and solid bodies, can be orthogonally decomposed into a normal compression/expansion process (the "piston process") and a tangential shearing process (the "running process").

The physical mechanisms of these two processes are entirely different. The piston process concerns longitudinal sound and shock waves, governed by a scalar equation, with the Mach number as its dominating parameter. The rubbing process concerns phenomena like boundary layers, detached shear layers and various vortices, governed by a vector equation, with the Reynolds number as its dominating parameter. A real dynamic interaction always directly relates to the piston and rubbing variables (typically, the total enthalpy and vorticity, respectively), rather than the primary variables (velocity and pressure). Evidently the splitting and coupling of these processes immediately leads to a corresponding splitting and coupling of vorticity dynamics and compression/expansion dynamics.

Funding: FY 1990:

Grants: 50K UTSI
Dr. J. M. Wu
Dr. J. Z. Wu

Progress:
The focus has been on searching for various consequences of the above splitting and coupling. The present project can be divided into two phases.

Phase I. A systematic study on the interaction between piston/rubbing field and solid surface for general viscous compressible flows.

Phase II. A thorough study on the formulation of flow problems in terms of piston/rubbing variables.

So far the works of Phases I and II have been completed and summarized as two companion journal manuscripts (submitted to J. Fluid Mech.): Splitting and Coupling of Fundamental Processes in Fluid Dynamic Interactions, Parts I and II.

Phase I (Part I of the manuscripts) concentrates on the re-interpretation of fluid-solid interactions in terms of piston/rubbing variables. The key results include:

(1) A set of general boundary coupling relations which governs how the piston/rubbing field is generated from an arbitrary solid surface and sent into the fluid. The importance of these relations have been widely recognized, but their complete form had never been obtained before. Some authors (in particular, some Caltech researchers) have used our results to explain various phenomena relevant to vorticity production and flow separation.

(2) The reaction of the generated piston/rubbing field to the solid body, represented by a series of new formulas of total force and moment. These formulas reveal new possibilities for vortex flow controls, as have been successfully proven by some simple water tunnel experiments (the experimental results are not included in the manuscripts and will be reported later).

Phase II represents the major progress in the past year. The problem of formulating flow problems in terms of piston/rubbing variables has been confronted in aeroacoustics and numerical vortex methods, but the most general and advanced formulation had been impossible until the work of Phase I was completed. The key results include:

(1) As a complement to the traditional hierarchy of approximation and abstraction levels, a new hierarchy has been found. This new hierarchy can meet widely varied requirements of various engineering problems.

(2) The boundary conditioning problem in the piston/rubbing formulation, which has bothered fluid machinists, applied mathematicians and CFD workers for years, is now thoroughly clarified for the first time.

(3) It has been found that the numerical method most appropriate for rubbing and piston processes are different. A fluid motion has both particle-face and field-face. While the particle-face is exclusively embodied in the rubbing process (it also has the field-face relevant to vorticity production and diffusion, but these are highly localized for high Reynolds number flows), the piston process is entirely a field behavior. Therefore, the splitting and coupling of these processes also lead to a corresponding splitting and coupling of the Eulerian method and Lagrangian method.

Richard W. Barnwell

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RELEASE NO. 91-02 January 11, 1991

LANGLEY SCIENTIST'S FINDINGS ARE KEY TO UNDERSTANDING THE OZONE HOLE

The internationally acclaimed research of a NASA Langley atmospheric scientist has sharpened the world's focus on ozone loss as a major threat to the planet's health. For his work in designing measurement devices, then using them to open a new window to understanding polar "ozone holes," Dr. M. Patrick McCormick will receive the prestigious Jule G. Charney Award of the American Meteorological Society. He is the first NASA scientist to be so honored.

McCormick's long-standing reputation as a leader in pursuit of the forces that are changing the Earth's atmosphere has been dramatically enhanced with his discovery and definition of Polar Statospheric Clouds (PSCs). This previously unknown upper atmosphere phenomenon is now recognized as a pivotal catalyst in the chemical reactions that are destroying the polar ozone curtain that protects us from the Sun's dangerous ultraviolet radiation.

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The role of PSCs in ozone destruction is linked to chlorine gas which is carried into the stratosphere as part of widely-used, man-made chemicals known as chlorofluorocarbons (refrigerants, aerosol propellants, fire suppressants, foam blowing agents, etc.). There, the chlorine is normally "locked" in stable compounds, but in the presence of PSCs these compounds react on the surfaces of PSCs, releasing active chlorine which then attacks ozone. And, chlorine has a voracious appetite--one molecule can destroy hundreds of thousands of ozone molecules. In addition, PSCs, in their formation as they condense, also remove nitrogen compounds that act to protect the ozone, further contributing to the vulnerability. "Without PSCs, I am convinced you would not have an ozone hole," McCormick says.

The satellite-borne measurement tools he developed use the solar occultation technique which involves measuring the amounts and characteristics of light in the atmosphere as the Earth passes between the Sun and the satellite. This study of the stratosphere from satellites began with the Stratospheric Aerosol Measurement (SAM) experiment flown on the Apollo-Soyuz mission of 1975--the historic collaboration between the US and Soviets. The effort continued in 1978 with unmanned devices aboard the Nimbus 7 spacecraft (still operating), the Application Explorer Mission spacecraft from 1979 to 1981 and the second Stratospheric Aerosol and Gas Experiment (SAGE II) aboard the Earth Radiation Budget satellite still operating today after its launch from the Shuttle in 1984.

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The SAM and SAGE experiments led McCormick to the discovery of PSCs whose presence are necessary for the alarming breakdown in the ozone shields of both Arctic and Antarctic regions. PSCs were first identified when his satellite measurements revealed there were extensive clouds in the coldest parts of the polar stratosphere, many more than previously thought. This finding was confirmed by laser detection from aircraft missions led by McCormick but, at that time in the late1970s and early 1980s, no wider notice was given the discovery. Later, as concern grew over ozone depletion and theories were advanced, analysis of these clouds became the paramount thrust of the international investigation in which McCormick played such a prominent part.

The Jule G. Charney Award is given in recognition of highly significant research or development achievement in the atmospheric or hydrologic sciences. It ranks as the second most prestigious among the many distinguished awards presented by the American Meteorological Society. The ceremony for McCormick will be a major event at the 71st Annual Meeting of the Society to be held January 16, 1991, in New Orleans.

McCormick has received a variety of honors in the 25 years he has pursued atmospheric research. He has twice served as chairman of the Society's Committee on Laser Atmospheric Studies and is the present chairman of the International Radiation Commission's International Coordination Group on Laser Atmospheric Studies. The Langley scientist was invited to participate in the Dahlem International Workshop on the Changing Atmosphere held in Berlin. He was also recognized with the Arthur S. Fleming Award for Outstanding Young People In

-more-

Federal Service, he received the NASA Exceptional Scientific Achievement Medal, and his work on defining the role of trace gases and aerosols at flight altitudes was recognized by a U. S. Senate Resolution. McCormick most recently won the H. J. E. Reid Award for Langley's outstanding scientific paper. He is a member of the American Geophysical Union and the American Meteorological Society.

He began his NASA career in 1967, coming to Langley as an aerospace technologist. In 1975 he became head of the Photo-Electronics Instrumentation Section and was named to his present position as head of the Aerosol Research Branch in 1975. He is now serving as project scientist for the Lidar In-Space Technology Experiment (LITE) scheduled for a 1993 Shuttle flight, is the principal investigator of the SAM II and SAGE I, II and III instrument investigations and serves on the NASA/World Meteorological Organization's Ozone Assessment Panel.

He holds a bachelors degree in physics from Washington and Jefferson College, both masters and doctoral degrees in physics from the College of William and Mary and an honorary doctorate from Washington and Jefferson College. He is the author of over 120 journal publications, has contributed to 10 books and has given more than 100 talks and invited lectures.

McCormick resides with his wife Judy, a Poquoson High School guidance counsellor, in Hampton, Virginia. They have two children, Lynn and Michael.

-end-

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For Release:

RELEASE NO. 91-05

January 25, 1991

NASA LANGLEY HONORS SCOUT PROJECT EMPLOYEES IN SPECIAL CEREMONY

Since 1959, NASA's Langley Research Center in Hampton, Virginia, has managed one of the nation's most successful and reliable launch vehicles, known as Scout.

On February 1, 1991, Langley will honor those who have worked on the Scout in a special ceremony, "Salute to Scout." The ceremony will be held in the H.J.E. Reid Conference Center, Building 1222, at 2 p.m.

NASA Langley transferred the management of the Scout Project to the NASA Goddard Space Flight Center, Greenbelt, Maryland, January 1, 1991.

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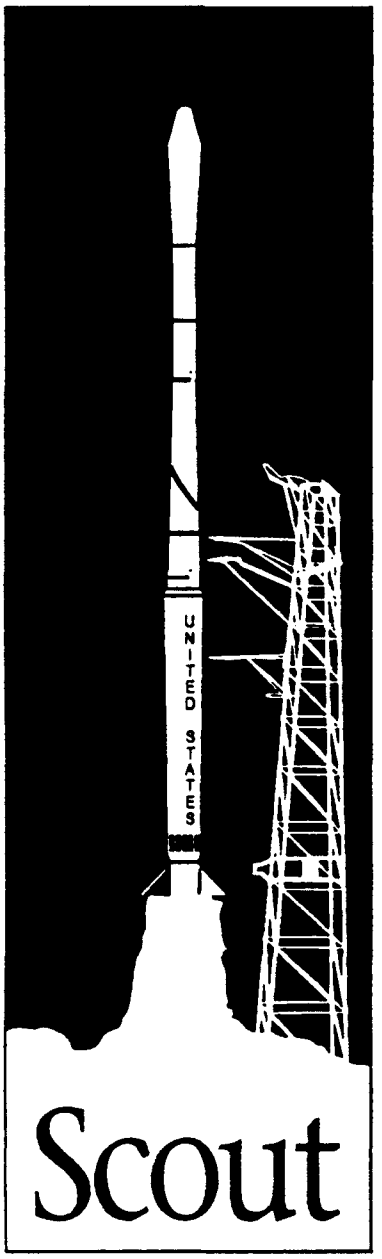
NOTE TO EDITORS: Photographs are available to accompany this release. NASA Langley and LTV employees who worked on the Scout Program will be available for interviews at the ceremony Friday, February 1. LTV is the prime contractor for the Scout. To participate in this event or to obtain photographs, please call the NASA Langley Office of Public Affairs, 864-6124.

SCOUT LAUNCH VEHICLE PROGRAM

FACT SHEET



Since 1959, NASA's Langley Research Center in Hampton, Virginia, has managed one of the nation's most successful and reliable launch vehicles, known as Scout.

Scout, an acronym for Solid Controlled Orbital Utility Test system, is a four-stage solid fuel satellite system capable of launching a 385-pound satellite into a 500-mile orbit. There have been 113 Scout launches, and its overall 96 percent success rate has earned this workhorse a spot in the National Air and Space Museum, where it stands beside other veterans of America's space program, such as Jupiter, Aerobee and Vanguard rockets. Scout's honor roll includes 23 satellites launched for international space organizations. Payloads have been launched for the European Space Research Organization, for Germany, for the Netherlands, for France, for Italy, and for the United Kingdom. Through the years, Scout has launched 94 orbital missions, (27 Navy navigational and 67 scientific satellites), seven probe missions and 12 reentry missions.

On January 1, 1991, after more than 30 years, NASA Langley transferred the management of the Scout Project to the NASA Goddard Space Flight Center, Greenbelt, Maryland.

Those who have worked on the Scout program have made a unique contribution to the U.S. space program. They have created a launch vehicle system that set a standard for simplicity, productivity and reliability. They did it by establishing uncompromising standards of exactness and by an unwavering pursuit of excellence. In these accomplishments, they created an atmosphere of teamwork and mutual respect that those who worked on Scout will never forget.

The Scout team has consisted not only of NASA Langley employees but a group of employees from the LTV Missiles and Electronics Group of Dallas, prime contractor for the development of Scout systems. In 1959, Langley Research Center awarded the contract to LTV to develop the airframe and launcher. This began a partnership between NASA Langley and LTV that has lasted for over thirty years. Scout's reliability stems from a sense of teamwork and cooperation between government agency and contractor. Together, these people shared success and failure--some of whom spent an entire career on the project. Ultimately, Scout is a vehicle that proved itself, over and over, to be reliable and dependable.

Scout's reliability also stems from standardized procedures and configuration control and from its simple, old-fashioned technology. The vehicle was built with off-the shelf hardware. Designers selected from an inventory of solid-fuel rocket motors produced for military programs: the first stage motor was a combination of the Jupiter Senior and the Navy Polaris; the second stage came from the Army Sergeant; and the third and fourth stage motors were designed by Langley engineers who adapted a version of the Navy Vanguard. The heatshield and fins are insulated with cork. The guidance system uses simple gryos that cannot be reprogrammed after launch. But this old-fangled technology makes Scout reliable and predictable.

Since its early development, the configuration of Scout has continued to evolve. Each of the motors has been upgraded at least twice, and improvements in rocket engine design have enabled the rocket to carry larger payloads. Even so, the current Scout G-1 configuration is very similar in appearance to that of the original vehicle--a testimony to the soundness of the original design.

Scout is 76 feet long, 45 inches in diameter and weighs 48,600 pounds. Its four solid propulsion rockets are joined by transition sections containing guidance, ignition, spin up motors and separation instrumentation necessary for flight.

The first stage is the Algol. It is 30 feet long and 45 inches in diameter. The motor burns for an average of 82 seconds with a maximum thrust of 140,000 pounds. At the bottom of this motor are the first stage altitude control jet vanes and fin tips, which steer the vehicle during initial launch.

The second stage, Castor, is 20 feet long and 30 inches in diameter. This stage fires for 41 seconds and develops 60,000 pounds of thrust.

Stage three rocket motor, the Antares, is 10 feet long and 30 inches in diameter. It burns for 48 seconds at 18,000 pounds of thrust. The second and third stage control is provided by hydrogen peroxide jets.

The fourth stage, Altair, is a mere five feet long and 20 inches in diameter. It burns for 34 seconds and develops 6000 pounds of thrust. Its control is provided by spin stabilization.

The heat shield covering the fourth stage and payload section is made of cork and fiberglass laminate.

Launch sites for this nation's workhorse are located at the NASA Wallops Flight Facility, Wallops Island, Virginia; at the Western Test Range, Vandenberg Air Force Base, California; and at Kenya, Africa.

The NASA space program has given us images that have become imprinted on the national consciousness as icons of success. Here is one more to consider: our nation's workhorse--Scout.

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For Release:

RELEASE NO. 91-56

April 26, 1991

PETERSEN PRESENTED AIAA REED AERONAUTICS AWARD

NASA Langley Research Center Director Richard H. Petersen will be presented the Reed Aeronautics Award May 2 at ceremonies in Arlington, Virginia, during the annual meeting of the American Institute of Aeronautics and Astronautics (AIAA).

This prestigious award honors the most notable achievement in the field of aeronautical science and engineering. It is awarded in memory of Dr. S. A. Reed, aeronautical engineer, designer and founding member of the former Institute of Aeronautical Sciences, which joined with the American Rocket Society to form AIAA.

Petersen is being recognized for his "outstanding leadership and contributions in aeronautical science and engineering, which have had a significant impact on the scope and direction of the nation's aeronautical capabilities in the continuing move to hypersonic speeds."

Appointed in January 1985, Petersen directs the first aeronautical research laboratory in the federal government, founded in 1917. As NASA Langley's senior management official, Petersen is responsible for the Center's aeronautical and space research programs, as well as facilities, personnel and administration. He is also an advisor to the NASA Administrator.

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Petersen joined NASA at Ames Research Center, Moffett Field, Calif., in 1957. His initial work was in theoretical and experimental aerodynamics, particularly in the supersonic and hypersonic speed ranges. He later directed computer studies of advanced aircraft including hypersonic transports, airbreathing launch vehicles, short takeoff and landing transports and general aviation aircraft.

Before coming to Langley, he was named chief of the Aerodynamics Division at Ames, where he directed a 200-person team conducting research in aerodynamics and fluid mechanics in several major wind tunnels.

Petersen came to Langley in July 1980 as Deputy Director, responsible for aeronautical research and technology programs and for institutional management of facilities and equipment.

Petersen graduated with highest distinction from Purdue University in 1956 with a bachelor of science degree in aeronautical engineering. He earned a master of science degree in aeronautics from the California Institute of Technology in 1957. He was a Sloan Executive Fellow at the Stanford Graduate School of Business from 1972 to 1973. He received an honorary doctor of engineering degree from Purdue University in May 1986 and an honorary doctor of public service degree from George Washington University in May 1987.

The recipient of numerous awards, Petersen was presented a Distinguished Presidential Rank Award in September 1989, a NASA Outstanding Leadership Medal in October 1984, and a Presidential Rank of Meritorious Executive in January 1983. In December 1980, Purdue University awarded him the Distinguished Alumnus Award from the School of Engineering.

He and his wife Joandra live in Williamsburg, Va.

-end-

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For Release:
May 13, 1991

Release No. 91-62

HISTORIC AIRCRAFT RETIRES TO STAR IN NEW MUSEUM

It's been blasted by more than 700 lightning strikes, simulated a supersonic transport and tested a wing design for future fighters. Now "NASA 816" -- a specially modified Convair F-106B -- has retired after more than 3 decades of flight research. NASA 816 made its last flight on April 30. It was the last known piloted Convair F-106 still flying.

In a May 17 ceremony at Langley Research Center, Hampton, Va., NASA 816 will be symbolically transferred to the new 110,000 square-foot Virginia Air & Space Center, Hampton. The aircraft will move to its new home this summer and go on display with other civilian and military aircraft in time for the center's grand opening in the spring of 1992.

In 30-plus years of service, NASA 816 was flown in support of U.S. Air Force research and development testing (9 years), assisted research in support on the U.S. supersonic transport program of the 1970's at NASA's Lewis Research Center, Cleveland (13 years) and conducted storm hazards and vortex flap programs at Langley (12 years).

The F-106 design has special significance for Langley Research Center. Dr. Richard Whitcomb, a distinguished Langley retiree, played a key role in developing the "area ruled"

fuselage used on the Convair F-106 and its predecessor, the F-102A. The Coke-bottle-like shape was a revolutionary advance in aircraft design that made supersonic speed in level flight practical. An F-106 set a world speed record of 1,525 mph in 1959 and still holds the record as the fastest single-engine turbojet-powered airplane. NASA 816 is a two-seat F106B. The second seat allowed flight test engineers to ride along, operating test equipment and making observations.

For the Air Force, the aircraft tested new modifications before the modifications were incorporated in the F-106 fleet. It served at Edwards, McClellan, Tyndall and Holloman Air Force Bases, Geiger Field, Spokane, Wash. and Convair/General Dynamics, Fort Worth.

The F-106B was a one-of-a-kind workhorse at Lewis. Under its left wing, it carried an extra engine to study how the propulsion system interacts with the highly-swept wing of a supersonic airplane. Under its right wing was a comparison engine. In more than 300 flights from 1966 to 1979, researchers collected valuable information that contributed to the understanding of supersonic aerodynamics and engine noise.

At Langley, NASA 816 was "lightning hardened" and purposely flown into thunderstorms to be struck by lightning. Through the storm hazards program, much was learned about the fundamental nature of in-flight lightning that will benefit designers of future aircraft.

Today's aircraft are relatively immune from the effects of lightning, but future aircraft may be more susceptible due to increasing use of nonconductive composite materials for aircraft structure and increasing use of lightning-sensitive electronic control and display systems.

For its next series of flights, NASA 816's wings were reshaped for best aerodynamic performance at times when a supersonic airplane must fly at subsonic speeds. These times can be critical for a military airplane in aerial combat or for a supersonic transport attempting an efficient, relatively-quiet takeoff. The NASA-developed modification, a thin downward pointing

flap added to the wing leading edge, greatly reduced drag and proved the "vortex flap" idea.

NASA 816 was manufactured in 1958 by the Convair Division of General Dynamics. In all, 277 F-106A and 63 F-106B "Delta Dart" airplanes were built at a cost of about $5 million each. Each F-106 was powered by a single Pratt and Whitney J75-P-17 turbojet engine. Developed as a Mach-2 interceptor, its mission was to intercept unidentified aircraft as they entered U.S. airspace. The F-106 served with the USAF Air Defense Command, Tactical Air Command and Air National Guard.

The Air Force has retired the F-106, once called the "ultimate interceptor," from active squadron service after a long and distinguished career dating from the late 1950's. Remaining aircraft fly as drone targets during air-to-air missile training for the current generation of fighter aircraft.

- End -

NOTE: STILL PHOTOGRAPHS AND A SHORT VIDEO CLIP ARE AVAILABLE UPON REQUEST.

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For Release:
May 14, 1991

Release No. 91-63

NASA TO TEST FLIGHT-WEIGHT AERO-SPACE PLANE COMPONENT

NASA is preparing to test a structural component made of advanced carbon-carbon composite material as part of the X-30 National Aero-Space Plane (NASP) program. Carbon-carbon is an advanced heat-resistant, non-metallic material that may be used on the NASP flight research vehicles in the mid-1990s.

The NASP mission profile demands much greater performance from its structures and materials than does the Space Shuttle, which travels through the atmosphere in a relatively short time. Engineers expect that the X-30 will experience structural loads at extreme temperatures and sustained high temperatures in high-altitude cruise through the atmosphere.

Design and fabrication of this major NASP flight-weight component follows years of technology development. The carbon-carbon material is stronger than metal at high temperatures. It's also lighter than aluminum, making it a good alternative in areas where active cooling can be avoided.

The component is part of a full-scale wing control surface from a generic NASA aerospace plane design. The structure was shipped to NASA's Ames-Dryden Flight Research

Facility, Edwards, Calif. last week for extensive tests to begin this Fall. The flap-like component first will be tested for its ability to withstand mechanical loads similar to those on a vehicle that takes off from a runway like an airliner and flies into orbit.

Thermal trials are scheduled to start in Fall 1992. Initial tests will be limited to state-of-the-art strain measurement capabilities -- about 600 degrees F. Researchers hope to achieve test temperatures exceeding 2000 degrees F. by 1993.

The Missile Division of LTV Corp., Grand Prairie, Texas, designed and built the NASP test component under contract to NASA's Langley Research Center, Hampton, Va. LTV's successful fabrication of the somewhat stiff composite represents a major milestone in materials technology development.

"The fabrication was challenging," said Dr. Wayne Sawyer of Langley's Structural Mechanics Division. "It is a big part that requires a series of fairly high-temperature thermal cycles in the fabrication process. These thermal cycles result in material deformations in some way or another. It shrinks and expands and tends to warp. Just being able to make a big part or several big parts that will fit together is very tough and requires good control of the tolerances and the fabrication process."

The rib-stiffened NASP component is about 56 inches long, 39 inches wide, 14 inches thick at the leading edge and 6 inches thick at the trailing edge. It is patterned after part of a flight control surface called an elevon, which is mounted at the back of some aircraft and the Space Shuttle orbiter to provide pitch and roll control.

"To our knowledge the component is made of some of the most complicated carbon-carbon parts ever fabricated," said Langley's Dr. Don Rummler, also of the Structural Mechanics Division. The need for a load-bearing tube with multiple layers and many holes

and cutouts complicated the fabrication task. High-temperature requirements dictated that even simple parts like fasteners were made of carbon-carbon.

Extra care was taken to overcome the potentially serious problem of delamination of the materials, which is almost impossible to repair. Technicians built up the test structure one thin layer at a time; it has 42 layers, or plies, at its maximum thickness.

The component parts were heated to high temperatures several times and densified to increase their strength, in a process Rummler likens to "burning toast." Strength went up with each processing cycle, as epoxy-like material was used to densify the material by filling tiny voids in the carbon matrix between heat treatments. A final coating protected exterior surfaces against oxidation.

Just where, how and if advanced carbon-carbon will be used in the X-30 has yet to be decided. "The material and the advanced fabrication procedures developed to make the elevon structure represent an option that we did not have at the beginning of the National Aero-Space Plane program," explained Rummler. "It is a design-efficient, light-weight alternative."

- End -

NOTE: A SHORT VIDEO CLIP ILLUSTRATING COMPONENT ASSEMBLY WILL BE MADE AVAILABLE UPON REQUEST.

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RELEASE NO. 91-64 May 23, 1991

NOTE TO EDITORS: NASA TO HOLD FIRST LDEF RESULTS MEETING

NASA will hold the first Long Duration Exposure Facility (LDEF) Post-Retrieval Symposium June 2-8, 1991, at the Hyatt Orlando in Kissimmee, Fla. LDEF exposed 57 science and technology experiments to space for nearly six years until Shuttle Orbiter Columbia returned it to Earth in January 1990.

Conference participants include LDEF investigators and members of the Special Investigation and Supporting Data Groups. Potential users of the information within the general aerospace community also will attend.

Over 125 papers are scheduled on topics such as ionizing radiation, meteoroids and debris, space environmental effects on materials and systems and Space Exposed Experiment Developed for Students (SEEDS).

First examination of LDEF's experiments and supporting hardware has revealed a wealth of information on radiation, meteoroids, man-made debris, contamination, vacuum, atomic oxygen impingement, and ultraviolet radiation. This knowledge is invaluable for the design of future spacecraft that must operate many years in space.

-end-

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RELEASE NO. 91-70 June 11, 1991

LANGLEY TEAM KEY CONTRIBUTOR TO PRENATAL CARE TECHNOLOGY

The application of sensor technology to an invention aimed at identifying problem pregnancies has placed a Langley team, headed by Dr. Allan J. Zuckerwar, in the forefront of an innovative transfer of NASA science to a medical initiative. The device is a fetal heart rate monitor designed to be portable so the expectant mother can oversee the health of her developing baby daily in her home.

Zuckerwar became involved when the Langley Technology Utilization (TU) and Applications Office was contacted by Dr. Donald A. Baker, M.D., of Spokane, Washington, who had developed the concept but needed help with its practical implementation. Baker's interest stemmed from his experience in treating difficult pregnancies involving women who could not or would not get adequate prenatal care--hence the idea of providing something that would signal the need for medical attention.

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The fetal heart monitor is an excellent barometer of the baby's health since its beat rate changes measurably in response to such influences as maternal smoking, anemia, drug abuse, alchohol abuse, choking the umbilical cord, high blood pressure, extended gestation, diabetes or maternal infection. In many of these situations, the baby could be healthy one day and in a life threatening condition 24 hours later. A daily monitor would sound an alarm and alert the mother to call her clinic for help.

Zuckerwar's challenge was to adopt sensors and signal processing equipment into a package that was small enough to be portable, yet easy to apply and operate. He also needed to avoid existing instrumentation which uses pulsed Doppler ultrasound that is highly sensitive to abdominal position and is bulky.

Zuckerwar decided upon passive, film-type acoustical sensors which are flexible, rugged, chemically stable and which produce voltage when loaded by pressure. These sensors have been used by Langley researchers to measure surface pressures on aircraft in flight and on wind tunnel models. In developing this approach, he points to the help he got from E. Thomas Hall Jr. and Timothy D. Bryant, both of Langley's Fabrication Division, who overcame extraordinary fabrication problems in supporting the effort.

Zuckerwar's approach uses a center sensor surrounded by six more in a circle. This array is mounted on a belt worn by the mother. It is designed to do five things: detect pressure pulses arriving at the abdominal surface of the mother, cancel signals due to rigid body motion of the mother, shield against radiostatic interference, insulate the sensors from environmental noise, and isolate the mother electrically from the signal processing equipment.

The signal processor itself is the manager of the whole system. For this sophisticated technology, Zuckerwar relied on the expertise of two Old Dominion University colleagues, electrical engineers Dr. John W. Stoughton and Dr. Robert A. Pretlow, M.D. The system they devised uses a computer which has been "trained" to recognize ideal fetal heart beat tones. It is also able to select which of the seven sensors is receiving the strongest signal. The computer

then discriminates, in real time, between normal signals from the baby's heart and those that do not fit ideal parameters. In the final commercial version, when an abnormal signal is detected, an alarm would be sounded for the mother to seek assistance.

The Langley effort to support the Dr. Baker's commercial interests in marketing the monitor is part of the NASA program to transfer the agency's space age technology to the private sector, according to Dr. Franklin H. Farmer of the Center's TU office. He adds that most of these transfers are to the medical community and that this fetal heart monitor program was funded by the TU office.

Zuckerwar, an electronics engineer in the Instrument Research Division, is known internationally as an authority in acoustics, aerodynamics and structural dynamics instrumentation research programs. He is currently leading a NASA/industry/university effort to develop high temperature fiber optic technology which will be applied to advanced sensors for use in hypersonic research in wind tunnels and on future hypersonic aerospace vehicles. Zuckerwar holds bachelors and masters degrees in electrical engineering from the Carnegie Institute of Technology and a doctoral degree from the Technische Hochschule in Stuttgart, Germany. He also did postdoctoral work at Columbia University and was an associate professor of electrical engineering at Youngstown State University until 1973 when he joined NASA.

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(Photographs are available from Langley Research Center to illustrate this story.)

NASA News

National Aeronautics and
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For Release:

RELEASE NO. 91-71

May 28, 1991

LANGLEY'S HALOE EXPERIMENT COMPLETES OCEAN TRIP

NASA's Upper Atmosphere Research Satellite (UARS), carrying the Langley Research Center's Halogen Occultation Experiment (HALOE), has arrived at the Kennedy Space Center (KSC), Florida, following a trip by barge down the Atlantic coast from Salem, New Jersey. UARS is scheduled to be launched aboard the Space Shuttle Discovery this fall on STS-48.

The shipment came after the successful conclusion of an intensive 20-month integration and test activity at the General Electric's Astro-Space facility at East Windsor, N.J. GE Astro-Space is the integration contractor for UARS. HALOE also made a trip back to Langley last summer for hardware modifications and final end-to-end testing.

At KSC, UARS arrived at the barge turn basin adjacent to the Vehicle Assembly Building. The spacecraft was offloaded and taken to the Payload Hazardous Servicing Facility (PHSF) located in the KSC Industrial Area where it will begin final preparation and testing for launch.

UARS is the spearhead of a long-term, national program of space research into global atmospheric change and a leading element of NASA's Mission To Planet Earth. UARS will provide the comprehensive data base needed for an understanding of changes in the upper atmosphere and for informed policy decisions to address the human role in such changes.

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HALOE is one of ten experiments to be launched on UARS. It will provide important data needed to study the effects of chlorine, nitrogen and hydrogen-related compounds, as well as chloroflurometh*ane, on the ozone layer.* The long-term near global observations provided by HALOE will allow assessments to be made of the importance of the man-made versus natural sources of these componds in the upper atmosphere.

HALOE is a solar tracking instrument designed to monitor the vertical distributions of temperature and the key upper atmosphere trace gases, such as ozone, hydrogen chloride, hydrogen flouride, nitric oxide, methane, water vapor and nitrogen dioxide. Approximately 30 measurements will be made per day during the sunrise and sunset time of each orbit throughout the UARS mission, providing semi-continuous observations and nearly global coverage for the experiment.

UARS was designed and built by the GE Astro-Space Division, East Windsor, New Jersey, and Valley Forge, Pennsylvania. The UARS mission is managed by NASA's Goddard Space Flight Center, Greenbelt, Maryland, for NASA's Office of Space Science and Applications (OSSA). Langley has responsiblity for management of the HALOE experiment for OSSA, including fabrication, assembly and testing of the HALOE instrument, reduction of flight data, retrieval of geophysical data and supervision of scientific investigations. Dr. James M. Russell, Atmospheric Sciences Division, is the HALOE principal investigator. Dewey M. Smith,Systems Engineering Division, is project manager.

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For Release:

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June 14, 1991

CARD NAMED NASA LANGLEY CHIEF SCIENTIST

Dr. Michael F. Card has been selected Chief Scientist at NASA's Langley Research Center, Hampton, Virginia.

In this position, Card administers the Center's university research programs and is the principal adviser to the director and deputy director on the needs and attitudes of the Langley research staff. He has operating responsibility for the Director's Discretionary Fund, the Distinguished Research Associate Program, the Floyd L. Thompson Fellowship program, the Peer Review program as well as the selection of the H.J.E. Reid Award recipient.

Prior to this appointment, Card had been chief of the Structural Mechanics Division since 1980. From October 1988 to September 1989, he worked at the Marshall Space Flight Center, Huntsville, Ala., on the Space Shuttle as assistant to the director of the Marshall Structures and Dynamics Laboratory.

Card joined the Langley staff in 1958 and was appointed head of the Structural Evaluation Section in 1970. He was selected by the President's Commission on Personnel Interchange in 1972 as one of three NASA employees to participate in the Executive Interchange Program. As a result, he worked at TRW Space Systems Division, Redondo Beach, Calif., for one year.

He became head of the Structural Mechanics Branch in 1974 and head of the Structural Dynamics Branch in 1979. He was team leader for interdisciplinary research in large space systems technology and has done research on advanced aircraft and spacecraft structures, dynamics of space payloads, nonlinear analysis techniques and dynamics of the Space Shuttle System.

Born in Seattle, Washington, Card earned a bachelor of science degree in aerospace engineering from the Massachusetts Institute of Technology in 1958. He earned master of science and doctor of philosophy degrees in engineering mechanics from Virginia Polytechnic Institute and State University in 1964 and 1970, respectively. In July 1985, Card attended Harvard University's program for senior managers in government.

The author of over 30 papers on the structural mechanics of metallic and composite plate and shell structures, Card is a fellow of the American Institute of Aeronautics and Astronautics.

Card and his wife JoAnn live in Williamsburg, Va. They have three children.

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For Release:

RELEASE: 91-91

July 16, 1991

NASA'S LDEF YIELDS HARVEST OF SPACE SCIENCE DATA

NASA's Long Duration Exposure Facility (LDEF) yielded a rich harvest of data on the conditions in Earth orbit and how spacecraft materials and systems performed in that environment.

LDEF, built by NASA's Langley Research Center, Hampton, Va., studied the space environment during a 69-month sojourn from April 1984 to January 1990. It was NASA's first opportunity to expose a spacecraft, with an intentionally-selected set of materials samples, to the harsh environment of space for a long duration and retrieve the spacecraft and samples for extensive laboratory analysis.

The LDEF experiments gathered information on space radiation, atomic oxygen, meteoroids, contamination, space debris, space systems and life sciences and produced the following findings:

--A meteoroid experiment on LDEF recorded the direction and precise time of more than 15,000 impacts. Analysis will provide clues to the origin and evolution of both natural meteoroids and man-made debris.

--LDEF was the first satellite to detect beta meteoroids -- minute particles accelerated by solar radiation. Its experiments also identified debris particles from a number of Space Shuttle missions and apparently from other launch vehicles.

--Several investigators reported impacts on LDEF's trailing edge. Researchers believe the impacts show for the first time that debris particles exist in elliptical orbits.

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--The in-orbit performance of protective paints varied dramatically. White polyurethane paint was darkened by ultraviolet radiation, but atomic oxygen continually swept away the darkened paint on LDEF's leading edge. The latter effect caused these surfaces to look freshly painted.

--Many of the polymers on the leading surfaces of LDEF were eroded. Some Kapton thermal blankets completely eroded away from their experiments. Silvered Teflon thermal blankets suffered erosion, a decrease in mechanical properties and darkening and delamination around impact sites. Silicones and anodized aluminum, were unaffected by atomic oxygen.

--LDEF gathered a large body of data about induced radioactivity in aluminum, stainless steel, titanium, lead, copper and nickel. Researchers found radioactive beryllium-7 on LDEF's leading surfaces -- the first known evidence for radioactive isotope accumulation onto an orbiting spacecraft.

--Three cosmic ray experiments showed good sensitivity and resolution. The measurements are six times more sensitive than before.

--Most living specimens remained alive after exposure to varying degrees of radiation during their journey in space. Shrimp had shortened life spans and some genetic mutations. Plants grown from space-exposed seeds had variegated leaves and flower buds. Some leaf parts were a normal green, others totally lacked chlorophyll. These experiments are part of continuing international studies to increase knowledge of space environmental effects on biological organisms.

--Very few electrical or mechanical system failures were caused by the spaceflight environment. Some low-cost electrical components were used successfully, but relays were a continuing problem. The tape recorders functioned well, and data tapes had no loss of stored information.

--Researchers unexpectedly observed scoring on metal surfaces that had rubbed together, but saw no evidence of cold welding. Cold welding is the solid-state metallic bonding between atoms on opposing surfaces.

LDEF carried 57 different science and technology experiments. Investigators continue to study the LDEF results and draw conclusions that will contribute to the knowledge base for long-lasting space endeavors such as Space Station Freedom, the Earth Observing System and exploration of the Moon and Mars.

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EDITORS NOTE: Photographs and background information to accompany this release are available from the Langley public affairs office, 804/864-6122.

LDEF: TESTBED FOR SPACE STATION FREEDOM--AND BEYOND

NASA's Long Duration Exposure Facility (LDEF) connected a variety of experiments to form a family of space science applications. Those experiments are providing a bonanza of data about the long-term effects of the low Earth orbit environment. A recurring theme at the first LDEF Post- Retrieval Symposium was how that information will help the engineers and scientists planning Space Station Freedom.

Bruce Banks, tasked with finding the appropriate protective coating for Freedom's solar arrays, said, "We have looked at various silicones, such as the SiOx coating and silicon -filled Kapton and conventional Kapton that could be used on the solar arrays. We think that the SiOx coating on either side of two sheets of polyamide Kapton will be sufficient to withstand the atomic oxygen influence on the solar arrays."

Banks, an LDEF principal investigator from NASA's Lewis Research Center, Cleveland, explained that the two sheets are layered together with fiberglass netting and silicon to give a sandwich effect. This coating should meet the 15-year materials requirement for Freedom.

Investigators are also looking at the integrity of \LDEF systems data and preliminary results to compare different coatings available to protect Freedom's large radiators. Banks said one coating, a black paint called Z-93, held up very well on the LDEF Marshall Space Flight Center experiments.

The paint seems to offer several advantages. Its aerial density is lower and it is significantly lighter than other paints. It is a high-performance, durable coating with good long-term performance properties and it showed little darkening during LDEF's orbital stay.

Z-93 flew on Apollo and Skylab, so investigators have reasonable confidence in it. "We realize that you can reduce the amount of power needed on Freedom and save considerable weight--1200 pounds compared to Teflon--on the radiator surfaces with Z-93. You'd need a fairly thick coating of silver Teflon on the radiators to have them survive for 15 years," Banks said. "Z-93 is now considered the baseline candidate on the restructured Space Station Freedom."

"One very important finding from LDEF is how incredibly stable it remained during its 5.9 years in space," said Sally Little, liaison between the LDEF Science Office and the Space Station Freedom office at NASA Headquarters, Washington, D.C. "Freedom will be designed to remain stable as well, although its altitude will differ. LDEF brings home how important it is to protect the leading surfaces of a space system.

"We are using that information to help us determine how much shielding we need against the debris environment," Little noted. "We are confident now, however, that we don't need as much meteoroid and debris shielding on the trailing side of Freedom. We can save weight, reduce the maintenance requirements and ultimately save money--a direct result of the LDEF experience."

"It's imperative that the investigators in highly specialized disciplines come together to integrate, synthesize and disseminate this information into the community," said Little, "That's what the symposium was all about. We must translate this scientific information into terms that people in other disciplines can understand. In order for us to know how the electronics survived, for example, we have to understand radiation and its effects."

"It's so important to have a mission like LDEF," Little added. "It is allowing us to extrapolate data and compare it with ground data to determine the life of many materials for future missions. LDEF is definitely confirming how detrimental the space environment can be. A 7-day Space Shuttle mission is one thing; a 6-year LDEF mission is something else."

Looking further into the future, scientists are considering what the LDEF results mean for the design of lunar bases and Mars-bound spacecraft. For example, no radiation effects were observed in LDEF surface materials, but possible radiation effects were reported in uncovered solar cells, electronics and quartz crystal resonators. The effects of directional properties of trapped protons were clearly observed in aluminum tray clamps and stainless steel trunnion layers.

"These data will provide a high-precision test of new trapped proton directional models, said Tom Parnell, chairman of the radiation special investigation group from Marshall Space Flight Center. "Due to LDEF's long exposure and stability, the data base is unique and important for planning radiation shielding in future space systems."

LDEF's impact won't be limited to hardware. The life science experiment that probably received the most attention was SEEDS (Space Exposed Experiment Developed for Students), which involved distributing 12.5 million tomato seeds to over 3.5 million students.

"Reports show that space-flown seeds had slightly higher germination rates than unflown seeds," said William Kinard, Head, LDEF Science Office. This may indicate that space can be used to store seed material in the future. But the stimulus that this experiment has provided to student interest in science, may prove to be its most important contribution."

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RELEASE: 91-95

NASA TESTS NEW WINDSHEAR WARNING SYSTEM

Results from a NASA flight test program show that new sensor technology may provide airline flight crews with advance warning of "microbursts" that sometimes harbor potentially dangerous windshears.

A microburst is an intense downdraft that produces strong divergent winds near the ground, typically for a short duration and over a relatively small area. When an airliner is taking off or landing, a microburst can force the plane into the ground before the flight crew can take proper corrective action.

NASA's Boeing 737 Transport Systems Research Vehicle is equipped with a number of instruments intended to detect hazardous windshear in time for the aircraft to avoid it. NASA and the Federal Aviation Administration (FAA) are most interested in sensors that will provide a minimum of 20-40 seconds advance warning of microburst windshear conditions.

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Although airlines are in the process of equipping their planes with windshear detection systems, these commercial systems are designed to alert the flight crew that the aircraft is experiencing hazardous windshear. The FAA has mandated that airlines must select and install an approved microburst detection system on their aircraft by the end of 1995.

The NASA 737 flight tests represent the final phase of a joint NASA/FAA windshear research program started in 1986. The FAA determines the requirements for the program, while NASA is developing the technology for airborne sensors. Researchers believe the combination of ground-based and airborne detection will give commercial airline pilots precious extra seconds to avoid or escape a microburst.

NASA's 737 recently completed two series of test flights. The first was in the Orlando, Fla., area, June 9-21. The second series of flights took place in the Denver area, July 7-25. Orlando often has moisture-filled microbursts and Denver experiences relatively dry microbursts, making the areas excellent candidates for studying the full range of microburst conditions.

The flight test program was highly successful. Conditions in the Orlando area allowed the aircraft to make many microburst windshear penetrations after the storms had been measured by the forward-looking sensors. Denver weather during the deployment period did not produce the expected dry microbursts, but did allow strong gust front penetrations and other storm measurements. The NASA 737 also conducted radar surveys of terrain and ground traffic around the Orlando and Denver airports.

Both airports have experimental ground-based Doppler radars designed to spot windshear. Information from these radar systems was used in the studies to direct the aircraft toward microbursts. For safety, the aircraft flew 750 to 1,100 feet above the ground at 210 knots (about 240 statute mph).

This summer, the NASA 737 research aircraft carried the forward-looking remote sensors, one based on radar technology and one based on infrared technology. The radar sensor, a modified aircraft weather radar, detects sudden, large changes in raindrop velocities in a storm cell ahead of the airplane. NASA modifications to the otherwise off-the-shelf radar filter out false indicators like cars moving in opposite directions near the airport, allowing windshear readings near ground level. The infrared sensor is a passive instrument that measures temperature changes usually produced by microbursts.

The flight tests also demonstrated a Langley-developed data link between ground weather radar and the 737 and the feasibility of deriving a windshear alert from that data and displaying it in the aircraft. Warnings from ground weather radar today are typically relayed by voice.

The only way to ensure that these advanced instruments operate reliably is for the test aircraft to fly into a variety of shears and compare the instruments' performance with what the plane actually encounters. Researchers at Langley have developed a real-time computer program that accurately determines what the 737 detected.

The 737 and the NASA team are based at Langley Research Center, Hampton, VA.

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NOTE TO EDITORS: Still photos to illustrate this release are available to representatives by calling 202/453-8375:

Color: 91-HC-530 B&W: 91-H-628

Also, a 1 minute, 27 second edited video clip and a 9 minute, 40 second resource footage is available by calling 202/453-8594.

NASA News

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RELEASE NO. 91-99 September 19, 1991

NASA LANGLEY HONORED FOR NEW AIRCRAFT ACCIDENT PREVENTION AID

A flight deck decision aid designed to complement aircraft pilot skills in handling malfunctions and emergencies is the winner of a prestigious international award. This fault management system provides pilots information for the monitoring, diagnosis and recovery from engine and hydraulic system component faults. These capabilities are not presently provided by aircraft systems.

Faultfinder, developed at NASA Langley Research Center in Hampton, Va., was selected by *Research and Development* magazine as one of the 100 most significant technological advancements of the year. Its implementation will help flight crews prevent or reduce the severity of accidents. Faultfinder's principal developer, Kathy Abbott, head of the Human/ Automation Integration Branch, Flight Systems Directorate, began development of this

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decision aid seven years ago with NASA Langley researchers Paul Schutte, co-principal investigator, Mike Palmer, Wendell Ricks, and Lockheed research programmer Steve Smith.

Faultfinder is designed to simplify pilot management of engine and hydraulic failures by providing valuable information to the pilot regarding fault situations, and presenting it in an integrated and comprehensible form. This capability is particularly useful for the diagnosis of novel or complex faults involving physical damage--such as occurs in uncontained engine failures. This is significant because these faults are difficult for pilots to diagnose and have caused major aircraft accidents.

The problem with the majority of current engine system instruments is that they require the pilot to mentally process raw sensor data in failure situations that are time critical and often involve high pilot workload and associated pilot error. The Faultfinder concept processes raw sensor data into monitoring, diagnosis and recovery information that is more meaningful to the pilot in understanding current fault situations and their consequences.

Faultfinder's monitoring function provides early detection and displays abnormal sensor readings using the NASA Langley E-MACS (Engine Monitoring and Control System) format, a display concept for presenting monitoring information to the flight crew. The detection process begins when sensor readings become abnormal, not just when they exceed the normal operating range.

The diagnosis function identifies the cause and effects of known and unanticipated faults, then provides information about the faults and the resulting system status. Its identification of

the effects of the fault on the status of the physical system is equally as important as identifying the cause of the fault. The purpose of this operative diagnosis is to facilitate continued, safe operation, rather than identifying the part to repair.

The recovery recommendation function assists flight crews by providing checklists that contain the corrective actions for the diagnosed faults. The capability to notify a flight crew immediately of an abnormality and to specifically define the symptoms is unprecedented. This early definition will increase the crew's situational awareness and give them more time to develop a response before the situation becomes critical.

Applications for the future include modification of Faultfinder for use in any jet or turbine powered craft. It is currently designed for NASA Langley's Boeing 737 aircraft, and will be tested in simulated, critical situations.

Langley Research Center has earned 21 R&D 100 awards in its 24 years of competition. NASA ranks second on the list of R&D 100 award recipients. Faultfinder was chosen by a panel of 21 judges, including the editors of R&D magazine. The R&D 100 Awards banquet and exhibits program will be held September 19, at Chicago's Museum of Science and Industry.

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September 4, 1991

SPACE SHUTTLE DISCOVERY TO CARRY LANGLEY MIDDECK EXPERIMENT THIS MONTH

When Discovery rockets into orbit this month on Space Shuttle mission STS-48, it will carry one of the most complex experiments to be conducted in the orbiter middeck. The experiment called MODE, for Middeck 0-gravity Dynamics Experiment, is designed to study critical aspects of mechanical and fluid behavior of components for future spacecraft, such as Space Station Freedom.

MODE, developed by the Massachusetts Institute of Technology (MIT) under contract to the NASA Langley Research Center, is part of NASA's In-Space Technology Experiment Program (IN-STEP), which allows universities, industry and NASA to develop technology flight experiments that could be flown in space.

Testing space structures in the normal 1g environment of Earth poses problems because gravity significantly influences their dynamic response. Also, the suspension systems needed for tests in 1g further compliate the gravity effects. Models of space structures intended for use in microgravity can be tested more realistically in the weightlessness of space.

The experiment consists of special electronically-instrumented hardware that Shuttle astronauts will test in the craft's pressurized middeck section. MODE will study the sloshing

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behavior of fluids in partially-filled containers and the vibration characteristics of jointed truss structures.

The power, signal conditioning and data storage facilities for the experiment will be combined in an experiment support module, which functions as a miniature dynamics laboratory. Astronauts will control and monitor the MODE experiment by using a special purpose computer, with voluminous data being stored in an optical disk drive.

In the fluid portion of the experiment, designed to simulate fluid behavior in large tanks, four small, partially filled transparent plastic Lexan cylinders containing fluids (two water and two silicon oil) will be mechanically excited to make the contents slosh. The dynamics of the sloshing fluids will be studied through use of a force-balance unit which will accurately measure the forces caused by the sloshing. Silicon oil has dynamic properties that approximate those of typical spacecraft fluid propellants. Water is more likely than the silicon oil to stay together at one end of the cylinder, an important test condition. The same basic dynamic information will be obtained for both fluids.

The structural test article, a highly sophisticated, highly instrumented, jointed truss structure, is modeled after the original transverse boom of the Space Station Freedom and resembles the truss structure of a construction crane boom. When deployed in the Shuttle orbiter's middeck, the test device is about 72 inches long with an 8-inch square cross-section. The test structure, including a rotation joint similar to the "alpha joint" that will be used to control the orientation of the solor arrays on Freedom, will be reconfigured on orbit and tested

in four different arrangements. All of the configurations are expected to behave differently in the weightless environment of orbital flight than on the ground.

Each test requires a computer controlled actuator to gently shake the structure. Eleven accelerometers and four strain gauges will be arranged along the structure and will measure how the structure responds to the "pulses" from the actuator. In the course of the two-day on-orbit testing, astronauts will monitor and videotape the experiments, modifying them when necessary as unexpected conditions arise.

This low-cost experiment will provide better understanding of the capabilities and limitations of ground-based suspension systems used to measure the dynamic response of complex structures. It should lead to more sophisticated computer models that more accurately predict the performance of future large space structures and the impact of moving liquids in future spacecraft.

The MODE experiment was awarded to MIT's Space Engineering Research Center in 1987, with the center's director Professor Edward F. Crawley as the principal investigator. Payload Systems Inc., Cambridge, Mass., was selected by MIT to be the prime subcontractor responsible for hardware fabrication and certification, and mission support.

McDonnell Douglas Space Systems Company, Huntington Beach, Calif., joined the program in 1989. The company has used its own funds to support the design and construction of the MODE structural test article and will participate in the flight data analysis.

IN-STEP is funded by NASA's Office of Aeronautics, Exploration and Technology in Washington, D.C. MODE is managed by Langley's Space Station Freedom Office. Along with NASA Headquarters in Washington, D.C., Langley is providing technical and administrative assistance in integrating the experiment into the Space Shuttle.

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RELEASE NO. 91-113 September 19, 1991

NASA LANGLEY HONORED FOR COMPOSITE MONITORING SYSTEM

A system capable of monitoring the important final curing process of composites without inducing structural change has been selected as one of the 100 most significant technological advances of the year.

The Thermoset Impedance Monitoring and Control System developed at NASA's Langley Research Center, Hampton, Va., has been selected for an R&D 100 Award by *Research and Development* magazine. Developed by Langley's Robert L. Fox and David Johnston, the system is the only one of its kind that is non-intrusive.

The monitoring system was chosen by a panel of 21 judges, including the editors of R&D magazine, which sponsors the competition. Robert Cassidy, R&D 100 chairman and the magazine's editor-in-chief, says that the winners are on the cutting edge of exciting, new technology.

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Langley Technology Utilization Officer Joe Mathis said, "This is an extremely prestigious award. R&D reviews approximately 2,000 applicants each year. The impedance monitoring system is one of only 100 that has been recognized and that means a great deal for NASA Langley."

This new technology non-invasively monitors the chemical changes that take place in composites during the curing process. Composites are materials, such as plastic, that are bound by resins to form a solid. A wide gun-like device is placed outside the composite and it uses an electromagnetic field to sense changes in resistance during the composite's finishing process or curing. Measurements are made of the changes in the resulting induced electric current which indicate the composite's chemistry during curing. This system allows for more reliable and efficient measurement of the changes because no foreign material is introduced into the composite.

"Previously, we had to actually place a capacitative gauge in the composite to monitor the change. That induced a permanent structural flaw in the composite because the gauge could not be removed. The key to this new technology is that it is non-intrusive and this is the only one of its kind that is non-intrusive," said Fox.

Fox, a NASA Langley electronics technician, and Johnston began developing the system in 1985. Johnston is now a self-employed electronics technician.

Composites are used instead of metals in applications as diverse as aircraft, artificial joints and helicopter drive shafts because they are lighter, stronger and more resistant to environmental conditions.

"This system could reduce the cost of processing and the time involved in determining the cure rate. It also can be used in other methods such as a thickness monitor or to no-intrusively test stress and strain. It can be utilized for many purposes and will be helpful to many industries," said Fox.

Throughout his 20-year career with NASA Langley, Fox has received one previous R&D award, holds five patents with nine additional patents pending, and has been awarded several exceptional service medals.

According to Mathis, Langley is ranged second among the NASA centers for R&D 100 awards. This is NASA Langley's 22nd such award.

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RELEASE NO. 91- 114

September 13, 1991

NASA MOUNTS AIRBORNE EXPERIMENT FOR INTERNATIONAL ATMOSPHERIC STUDIES IN THE PACIFIC

Man's impact on the chemical processes occurring in the atmosphere of the western Pacific ocean will soon be the focus of studies by scientists from Pacific Rim countries and the United States. NASA, in cooperation with the Japanese National Institute of Environmental Sciences (NIES), will spearhead this effort as part of the space agency's continuing role in the assessment of global atmospheric chemistry.

The expedition will combine measurements from airborne and ground-based sampling platforms in the quest to understand the natural chemical processes that take place in the troposphere, the lower portions of the atmosphere where man lives, and the susceptibility of this vital region to chemical changes from man's activities. The multi-year studies, to begin on September 16, 1991, are known the Pacific Exploratory Mission (PEM).

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The Pacific Ocean is a particularly attractive measurement arena because it is the only region in the Northern Hemisphere which is relatively free of atmospheric pollution. It is thus possible to study the chemistry of carbon, nitrogen, ozone, sulfur and aerosols in an almost unperturbed environment. However, mission atmospheric scientists say there is little doubt that the long-range transport of man-made air pollutants from Asia and North America is now starting to have a major impact on the atmosphere over the Pacific. The current studies will provide an excellent baseline of measurements to gauge how man's activities might affect the atmospheric cycles of those elements.

This international venture in the vast reaches of the western Pacific, illustrates the growing realization that the Earth's atmosphere is shared by all nations. Coordination of the overall effort is through the East Asia/North Pacific Regional Study which is part of the International Geosphere-Biosphere Program, an international oversight committee for environmental studies. The initial PEM study will consist of a series of field missions conducted over the next two to three years to evaluate the concentration levels of some 50 different atmospheric gas and aerosols species.

The primary measurement platform involved will be a DC-8 aircraft based at the NASA Ames Research Center, Moffett Field, Calif. This aircraft, carrying a suite of highly sophisticated instrumentation developed by scientists from U.S. and Japanese universities and from NASA Centers, will conduct at least 16 flights from Yokota Air Force Base, Japan; Hong Kong and Guam. An instrumented aircraft from NIES will also conduct measurements coordinated with those of the NASA DC-8. Ground stations, which will provide a set of intensive measurements during the same time the aircraft are active, are situated on several remote

Pacific islands, on the eastern coast of China, and in Japan, Korea, Taiwan and Hawaii. These stations will remain in place after the airborne missions to provide a longer term study of selected chemical species.

Essential to the project's success is weather data which will be provided by a team of meteorologists stationed at the Royal Observatory in Hong Kong. This will be the central point for satellite reception of a wide array of meteorological data and retransmission of up-to-the-minute weather forecasts to the DC-8 before each flight. Meteorologists at the Royal Observatory will also assist in analysis and interpretation of real-time, high-resolution imagery which will be stored for more detailed post-mission scrutiny.

NASA leadership is provided by the Program Manager Dr. Robert J. McNeal from NASA Headquarters, Washington, D. C., and by Project Manager James M. Hoell Jr. of the NASA Langley Research Center, Hampton, Virginia. Acting as Co-Mission Scientists and showing the diverse representation of U.S. scientists in the project are Dr. Douglas D. Davis, Georgia Institute of Technology, Atlanta, and Dr. Shaw C. Liu, National Oceanographic and Atmospheric Administration, Boulder, Colo. The NASA Mission Meteorologist is Dr. Reginald Newell from the Massachusetts Institute of Technology. Japanese research activities are led by Dr. Hajime Akimoto of the NIES who is also chairman of the East Asia/North Pacific Regional Study steering committee.

A data protocol has been developed which will foster timely analysis, interpretation and publication of the results. It is designed to enhance collaboration among this international team of investigators and to produce an integrated archive to serve as a central repository of data products for release to the public domain.

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Langley Research Center
Hampton, Virginia **23665-5225**

Jean Drummond Clough
(804) 864-6122

For Release:

RELEASE NO. 91-125

November 1, 1991

NASA LANGLEY TO HOST LDEF MATERIALS WORKSHOP

The Long Duration Exposure Facility (LDEF), retrieved by the Space Shuttle Columbia in January 1990 after spending nearly six years in Earth orbit, has generated a wealth of information on meteoroids, man-made debris, contamination, atomic oxygen, vacuum and radiation. Scientists who have studied the spacecraft and its 57 science and technology experiments and the supporting hardware declare that this information will be invaluable in the design of future spacecraft.

Now scientists want additional information on how well LDEF materials held up during the lengthy exposure to the space environment.

o How has the space environment affected materials such as polymers, metals, ceramics, composites and batteries?

o How have initial Long Duration Exposure Facility (LDEF) results affected the potential space applications of such materials?

o How have these results affected materials development, ground simulation testing and the materials needs for future flight experiments?

These questions will be addressed during the LDEF Materials Workshop '91 November 19-21, 1991, at the NASA Langley Research Center. The conference, sponsored by the LDEF Materials Special Investigation Group, will be held in the H.J.E. Reid Conference Center,

-more-

14 Ames Road. The purpose of the workshop is to update the information exchanged between LDEF materials investigators at the First LDEF Post-Retrieval Symposium held last June in Orlando and to transfer this information to potential users in the general aerospace materials community.

The general workshop agenda includes technical sessions and panel meetings. Papers will be presented on LDEF materials, environmental parameters and data bases; LDEF contamination; thermal control and protective coatings and surface treatments; polymer/films; metals, ceramics and optical materials; polymer-matrix composites; and lubricants, adhesives, fasteners, solar cells, batteries and seals.

NOTE TO EDITORS: Attendance is unrestricted but reservations are required. For more information or to register for the workshop, please call the Office of Public Affairs, 864-6122.

-end-

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665-5225

H. Keith Henry
804-864-6123

For Release:
Nov. 15, 1991

Release No. 91-127

NASA-Langley to Hold Space Stamp Ceremony

A Second Day of Issue ceremony for the recently issued Space Exploration Commemorative Stamps set will be held Friday, Nov. 22, by the U.S. Postal Service at NASA Langley Research Center, Hampton, Va.

The ceremony, sponsored by the Langley Alumni Association, will be held at 2:30 p.m. at the H. J. E. Reid Conference Center, 11 Ames Road.

Two Langley projects -- the Lunar Orbiter and Viking -- were featured on two of the 10 Space Stamps dedicated at the First Day of Issue ceremony at the Jet Propulsion Laboratory in October. Israel Taback represented Langley at that event. Taback, chief engineer for The Bionetics Corp., was chief engineer at Langley on the Viking and Lunar Orbiter projects.

The 29-cent stamps depict unmanned spacecraft traveling to the Earth's moon and the planets that orbit the Sun (except for Pluto which has not been explored). Mariner, Landsat, Pioneer and Voyager are depicted on the other stamps. The stamps were designed by Ron Miller of Fredericksburg, Va.

At the Langley ceremony, a representative of the U.S. Postal Service will present a replica of the 10 stamps to the Center. A cachet (an illustrated souvenir envelope) and stamps will be available in the lobby of the Reid Center by the postal service. The postal service will set up an operation to hand-cancel the cachet with a special second-day cancellation.

- End -

NASA News

National Aeronautics and
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Washington, D.C. 20546
AC 202 453-8400

Ken Atchison
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

For Release
October 3, 1991

RELEASE: 91-161

NASA ADMINISTRATOR ANNOUNCES KEY APPOINTMENTS

NASA Administrator Richard H. Truly announced today several key appointments:

Arnold D. Aldrich, currently the Associate Administrator for the Office of Aeronautics, Exploration and Technology, has been selected as Associate Administrator for the recently announced Office of Space Systems Development.

Aldrich brings a wealth of knowledge in managing the development of large projects as a result of his many years of experience in various assignments, including the Space Shuttle program. He was instrumental in providing the program leadership in the safe and successful return to flight of the Space Shuttle.

Richard H. Petersen, Director of the Langley Research Center, Hampton, Va., will come to Headquarters to become the Associate Administrator for the Office of Aeronautics and Space Technology, formerly the Office of Aeronautics, Exploration and Technology.

Petersen has been the Director of the Langley Research Center since January 1985. He also served as Deputy Center Director from 1980-85. Prior to coming to Langley, Petersen was Chief of the Aerodynamics Division at the Ames Research Center, Moffett Field, Calif. Petersen joined the National Advisory Committee for Aeronautics, NASA's predecessor agency, at Ames in 1957.

William B. Lenoir, currently the Associate Administrator for the Office of Space Flight, will continue to head that Office, with its new focus on space flight operations.

- more -

Charles T. Force will remain in his current assignment as the Associate Administrator for the Office of Space Communications, formerly named the Office of Space Operations.

NASA field center reporting assignments will remain unchanged, and transition plans will be arranged as soon as possible.

In announcing these appointments, Truly said, "NASA is extremely fortunate to have such outstanding senior executives ready to take on these challenging new responsibilities. With the creation of the Office of Space Systems Development and these key appointments, NASA will be better aligned to execute the development and operation of Space Station Freedom as well as other new capability development projects, and to focus more directly on efficient space operations. These management changes will also ensure a strong future in NASA's aeronautics research and space technology efforts."

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
AC 202 453-8400

For Release

David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

October 15, 1991

RELEASE: 91-171

HOLLOWAY NAMED LANGLEY RESEARCH CENTER DIRECTOR

NASA Administrator Richard H. Truly today announced the appointment of Paul H. Holloway as Director of the Langley Research Center, Hampton, Va. Holloway, who has been Deputy Director at Langley since February 1985, succeeds Richard H. Petersen who was recently appointed the Associate Administrator for the Office of Aeronautics and Space Technology, NASA Headquarters, Washington, D.C.

Holloway began his career at Langley in 1960 as an aerospace research engineer. He was appointed Head of the Systems Analysis Section, Aero-Physics Division, in 1969 and Head of the Aerospace Operations Analysis Branch, Space Systems Division 1971. He was Chief, Space Systems Division, from 1972 until he became Director for Space in May 1975, a position he held until being named Deputy Center Director in 1985.

In making this appointment, Truly said, "We in NASA are very fortunate to have leaders with the professional reputation and experience of Paul Holloway to fill our most senior positions. The Langley Research Center, as NASA's longest standing field organization, vividly represents the research and exploration heritage of the entire agency, and Paul Holloway is the ideal person to be at it's helm."

Holloway is the recipient of many prestigious awards including the Senior Executive Service's Distinguished Presidential Rank Award in 1987, the Presidential Rank of Meritorious Service in 1981, and the NASA Outstanding Leadership Medal in 1980.

Holloway and his wife Barbara have one son and reside in Poquoson, Va.

- end -

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Washington, D.C. 20546
AC 202 453-8400

For Release

Drucella Andersen
NASA Headquarters, Washington, D.C.
(Phone: 202/453-8613)

December 4, 1991

RELEASE: 91-198

BEACH NAMED LANGLEY DEPUTY DIRECTOR

NASA Administrator Richard H. Truly today announced the appointment of Dr. H. Lee Beach, Jr., as Deputy Director of the Langley Research Center, Hampton, Va. Dr. Beach is currently the Director for the National Aero-Space Plane Directorate in the NASA Headquarters Office of Aeronautics and Space Technology, Washington, D.C.

From 1986 to 1989, Beach was Deputy Director for Aeronautics at the Langley Research Center. He began his NASA career at Langley in 1970 as a research engineer in hypersonic propulsion. He has served as Head of the Combustion Section, Leader of the Performance Analyses Group, Head of the Hypersonic Propulsion Branch and as Acting Chief of the High-Speed Aerodynamics Division.

Beach is a Fellow of the American Institute of Aeronautics and Astronautics and a past Chairman of the JANNAF Ramjet Committee. He has received the NASA Exceptional Service Medal and several group achievement awards for accomplishments related to high-speed propulsion. He has authored or co-authored numerous technical publications.

In making this announcement, Administrator Truly said, "Dr. Beach has exemplified outstanding leadership in managing the National Aero-Space Plane program for NASA. He and Center Director Paul Holloway will make an outstanding team to assure Langley's continued leadership in aeronautics and space research."

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NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia **23665-5225**

1917 - 1992
75 Years
NACA
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For Release:

January 1992

Dear Editor/Reporter:

We hope you will consider writing a story on the 75th anniversary of the nation's first civilian aeronautical laboratory, NASA's Langley Research Center in Hampton, Va. Our 75th anniversary offers an excellent opportunity to review the country's progress in air and space through the prism of the research center on whose foundation NASA was built.

We are prepared to help you develop an article on the anniversary or on other aspects of the center's work that may interest you. We can offer contacts with our engineers, scientists and administrators at all levels. Photographs, videos, fact sheets and other media materials are also available.

Langley has been on the forefront of air and space flight since shortly after the Wright brothers' historic flight. America's manned space program began here, and the center has been involved in many well-known air and space projects, from breaking the sound barrier to the landing of men on the moon, the Viking landing on Mars, the space station Freedom and the pioneering of technology for the space shuttle. The center also is applying its massive technological capability to one of the world's most pressing concerns, the study of the Earth's fragile atmosphere.

The following members of Langley's Office of Public Affairs are available to assist you:

Δ Cam Martin, manager, Office of Public Affairs
(804) 864-6121

Δ Keith Henry, public affairs specialist for aeronautics
(804) 864-6120

Δ Jean Clough, public affairs specialist for space
(804) 864-6122

Δ Michael Finneran, editor, Langley newspaper
(804) 864-6126

NASA News

National Aeronautics and
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For Release:

January 1992

Keith Henry
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(804) 826-8916 (evenings)

Michael Finneran
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(804) 627-5379 (evenings)

RELEASE NO. 92-001

NASA LANGLEY MARKS 75 YEARS OF AERONAUTICS AND SPACE RESEARCH

Langley Research Center this year celebrates 75 years as the country's first government-run civil aeronautical laboratory and the foundation on which NASA is built.

The Virginia-based facility, founded on July 17, 1917, was created by NASA's predecessor, the National Advisory Committee for Aeronautics, or NACA. Langley is now one of a dozen NASA facilities devoted to air and space technology.

Langley's work spans the era of air and space travel, from the biplanes of World War I, to "The Right Stuff" Mercury astronauts, to today's space shuttle. And just as the U.S. aircraft industry has grown into a world giant, so has Langley, from a small lab to a 5,200-employee high-tech center supporting the country's commercial, civilian and military aerospace development.

The center is equipped for research in space transportation systems and flight systems technology, aerodynamics, acoustics and noise, computer science, atmospheric sciences, electronics, information systems, materials and structures, physics and chemistry, optics and instrumentation.

– more –

Aviation pioneer

Langley's early contributions include the design of efficient wing and propeller shapes and the retractable, tricycle-type landing gear standard on most aircraft. Perhaps the most significant development of its time was Langley's so-called NACA cowling, an engine hood that greatly reduced wind drag. The cowling, first applied to biplanes, earned the center the first of five Collier trophies, awarded yearly for the greatest achievement in aerospace technology.

Much of Langley's success has been built on its wind tunnel work. The first was opened in 1920. Three years later the center built the world's most advanced aeronautical research tool, the Variable Density Tunnel, which became the primary source of precise data for a growing aviation industry and helped establish Langley's reputation as the world's premier aeronautical research center. That and later wind tunnels helped develop some of the most advanced airplanes in existence.

World War II dictated Langley's third decade as the center turned its attention to solving aerodynamic and structural problems in military aircraft already in production and to boosting the speed and altitude performance of combat planes on the drawing boards. By the war's end, Langley had helped test and redesign some 115 military aircraft.

In the 1940s and 1950s, Langley's work grew to include supersonic jet technology. The center won two more Collier trophies for high-speed aerodynamics. Research in high-speed flight technology played a major role in the transition to space. In fact, the legendary X-15 rocket plane, the first winged vehicle to fly into space, was a result of the center's research.

The space age

The National Aeronautics and Space Administration was established at the dawn of the space age in 1958 in response to the Soviet launch of Sputnik. Langley was at the center of the space effort, which began with the planning and management of the nation's first manned venture into orbit, Project Mercury. The original seven Mercury astronauts received their initial training at Langley.

Langley has handled other major space projects, including Viking, which flew two successful missions to Mars; Scout, the workhorse of small, expendable rocket launch vehicles; the space shuttle's aerothermodynamic testing; and the Long Duration Exposure Facility, a large satellite that carried materials and other space experiments into orbit for six years.

Langley's current projects include developing technologies for a high-speed aircraft, the National Aero-Space Plane, that can fly into orbit. The center also is working on space station Freedom and a shuttle-like craft, called the HL-20, that can taxi astronauts back and forth.

Environmental studies

Environmental global climate study is part of a major Langley effort looking at global change, especially of the Earth's atmosphere. Spacecraft, planes and ground instruments are used to analyze large-scale phenomena such as the "ozone hole."

Langley also provides support to military aircraft and contributes to the development of commercial and civilian air safety.

Langley will commemorate its 7-1/2 decades as one of the world's premier research centers with a year of events based on the theme "Expanding the Frontiers of Flight." Activities will include community leaders, schools and universities, the public and center organizations. Several observances will take place on the center's anniversary weekend in July. An open house for employees and the public is planned for October.

– end –

NASA News

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1917 - 1992
75 Years
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USAF 45th Space Wing, Fla.
(Phone: 407/494-7731)

For Release:
January 30, 1992

RELEASE: 92-02

EXPERIMENTS POINT TO POSSIBLE EASING OF LAUNCH RULES

This month, NASA began its final phase of "field mill" flight tests to study launch-related weather at its Florida launch site. "Field mills" are instruments that detect the presence of electric charges in the atmosphere.

Results from earlier flights demonstrated that present weather rules fully protect space launch vehicles from triggered lightning hazards. However, there is strong evidence that a number of rules are overly conservative and, potentially, could delay launches under weather conditions that do not pose any real lightning threats.

A NASA Learjet from Langley Research Center, Hampton, Va., has been flown in the vicinity of NASA Kennedy Space Center, Fla., and USAF launch facilities at Cape Canaveral, Fla.,

- more -

collecting meteorological data and atmospheric electric field strength data. Seasonal data has been taken for two summer seasons and one previous winter season. The flight test series just underway, the last in the series, is planned for 8 weeks.

"In a limited number of cases to date," said William Bihner, NASA Airborne Field Mill Program Manager, "the weather was in violation of launch commit criteria as written, but we did not measure an electrical hazard aloft. It looks very promising that by the conclusion of the program we will be able to recommend changes to present launch commit criteria that will maintain launch safety while reducing launch restrictions."

The set of criteria most likely to be relaxed are those that govern launches through or near cumulus clouds, large puffy clouds that appear most often in the spring and summer. The next best candidate for relaxation are those associated with layered clouds, seen most often in the winter. The layered cloud phenomena has the greatest impact on Space Shuttle and other rocket launches from the Kennedy center and the USAF Eastern Test Range.

There are six natural and triggered lightning constraints that can delay a launch. Flight data was collected for each. The first rule prohibits a launch within 10 nautical miles of any type of lightning 30 minutes prior to launch. The second prohibits a launch through or near cumulus clouds, depending upon the combination of distance and temperature at the cloud top. The remaining rules deal with the intensity of the electric field as measured at the surface, the presence or absence of vertically continuous layers of clouds and the presence of disturbed weather (moderate or greater precipitation) or debris clouds associated with a thunderstorm.

Safely opening the launch window even a little in the thunderstorm-prevalent Central Florida area could result in a significant reduction of lightning-related launch delays. Electrically charged clouds, believed to be lightning conducive, pass over the Cape Canaveral area more than 100 days each year, especially from May to September.

A lightning strike to a vehicle can be triggered when the vehicle passes near a

thunderstorm or even through an electric field left from a decaying thunderstorm. Components in the rocket or its payload can be damaged by the strike.

A change in lightning rules will not occur immediately, Bihner said. Enough data must be collected to be considered statistically significant and the conclusions must be scientifically validated, then Air Force and NASA officials will have to approve changes, he said. The process will be slow and deliberate because safety is involved, he added.

Funding for the joint NASA-Air Force Airborne Field Mill Program is provided by the NASA Headquarters Office of Space Flight, Washington, D.C. and the USAF Space Systems Division, Los Angeles.

Participants in the field mill program are drawn from the USAF 45th Space Wing and three NASA centers. The Marshall Space Flight Center, Huntsville, Ala., designed and fabricated the onboard electric field sensors and is responsible for data processing, archiving and analysis. Langley is providing the aircraft and all flight support. Kennedy is providing real-time weather data, aircraft guidance and real-time ground station support during data gathering flights. The aircraft is controlled from and data collected at the 45th Space Wing's Range Operations Control Center.

-end -

A photograph to illustrate this story is available to media representatives by calling NASA Langley at 804-864-6124.

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia **23665-5225**

1917 - 1992
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For Release:

February 1992

Dear Editor/Reporter:

Enclosed is a list of story ideas we invite you to pursue. The following members of Langley's Office of Public Affairs are available to assist you:

Δ Cam Martin, manager, Office of Public Affairs
(804) 864-6121

Δ Keith Henry, public affairs specialist for aeronautics
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Δ Jean Clough, public affairs specialist for space
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Δ Michael Finneran, editor, Langley newspaper
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For Release:

LANGLEY STORY OPPORTUNITIES

EASE SHUTTLE LAUNCH RULES? Initial results of flight tests indicate that at least some of the tough rules governing space shuttle launches could be relaxed. The weather-related rules sometimes delay launches, particularly when lightening is involved.
Public Affairs contact: Keith Henry, 864-6120
Science contact: Richard T. Bright II, 864-3871

OZONE ALERT: Langley scientists are participating in an airborne expedition over the Arctic to examine ozone depletion in the upper atmosphere, or stratosphere. Through March, the Airborne Arctic Stratospheric Expedition II is carrying a Langley measuring instrument on a DC-8 in search for answers to ozone depletion.
Public Affairs contact: Michael Finneran, 864-6126
Science contact: Dr. Edward V. Browell, 864-1273

CANCER GEL: This gel simulates cancer tumors so that doctors know ultrasonically if their hyperthermia treatment (heating the tumors) is working. This way, physicians don't have to invade the body with catheters to monitor the process.
Science contact: John A. Companion 864-4981

ULTRASOUND TO DETECT TOOTH DECAY. One medical device under development uses ultrasound to detect cavities. The other detects bedsores.
Public Affairs contact:
Science contact: Dr. Frank Farmer, 864-2490

ENVIRONMENTAL SPINOFF IS A BLAST. A new, environmentally sound paint removal process is being pioneered at Langley. The process removes paint by blasting it with recyclable steel shot, as opposed to sand that pollutes by carrying paint away. Langley is trying the process on its huge 16-Foot Transonic Tunnel and worked with the paint removal industry to successfully adapt the process for application on a large structure.
Public Affairs contact: Michael Finneran, 864-6126
Science contact: George Palko, 864-4571.

– more –

LASERS TO REPLACE WEATHER BALLOONS?: A laser-based system, Coherent Launch Site Wind Sounder (CLAWS), has been developed for measuring winds above launch sites that may eventually replace weather balloons as a means of gathering data aloft.
Public Affairs contact: Michael Finneran, 864-6126
Science contact: Dr. Daniel Moerder, 864-6495

THE FLYING PANCAKE. Charlie Zimmerman's WWII-era 'Zimmer Skimmer' is such a wild looking airplane that interest in it still hasn't died almost 50 years later. The Discovery Channel recently interviewed Zimmerman, a Langley retiree still living in the Hampton area, for a feature on the Skimmer. The radically-styled aircraft resembled a flying pancake and flew 40 mph faster than predicted. The war ended and the plane never went into production, but it still generates interest.
Public Affairs contact: Michael Finneran, 864-6126

NEW NASP COMPUTER GRAPHICS. A series of attractive, computer-generated still images have been created of the National Aero-Space Plane (NASP), the hypersonic aircraft being designed to take off under its own power from a conventional runway and fly into orbit. Call for copies.
Public Affairs contact: Keith Henry, 864-6120
Science contact: Lana M. Couch, 864-3736.

LANGLEY'S 75th ANNIVERSARY. Langley Research Center this year celebrates 75 years as the nation's first government-run civil aeronautical laboratory and the foundation on which NASA is built. Langley has been on the forefront of air and space flight since shortly after the Wright brothers' historic flight. America's manned space program began here, and the center has been involved in many well-known air and space projects, from breaking the sound barrier to the landing of men on the moon, the Viking landing on Mars, the space station Freedom and the pioneering of technology for the shuttle.
Public Affairs contact: Keith Henry, 864-6120

INTERNATIONAL SPACE YEAR. International Space Year is the first yearlong, worldwide celebration of humanity's venture into space. It commemorates the 500th anniversary of Columbus' voyage to the New World and the 35th anniversary of the International Geophysical Year, which, with the launch of the first artificial Earth-orbiting satellite, Sputnik, ushered in the space age. The year's theme is the global perspective of the space age, with emphasis on exploration and scientific inquiry, particularly the use of space technology to assess global warming, deforestation and ozone depletion.
Public Affairs contact: Marny Skora, 864-3315

– end –

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For Release:

February 25, 1992

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RELEASE NO. 92-16

NASA LANGLEY'S HOLMES NAMED ASSISTANT DIRECTOR FOR AERONAUTICS

QUICK LOOK: Dr. Bruce J. Holmes, of NASA's Langley Research Center, has been named assistant director for Aeronautics. Holmes, who began his NASA career in 1977, was acting deputy for Aeronautics until assuming his new position. He is the author or co-author of 70 technical publications and has won numerous awards, most recently the Piper General Aviation Award in 1991 from the American Institute of Aeronautics and Astronautics. He and his wife, Connie, and their two sons live in Newport News, Va.

Dr. Bruce J. Holmes has been named assistant director for Aeronautics at NASA's Langley Research Center. Holmes had been acting deputy until October.

"Since my lifelong passion is aviation, I am excited about working to shape its future," Holmes said of his appointment.

In his new position, Holmes helps direct the experimental and theoretical research work of the Directorate's four research divisions: Advanced Vehicles, Applied Aerodynamics, Flight Applications, Fluid Mechanics and the Hypersonic Technology Office. He also helps coordinate Center-wide aeronautics research involving the Structures, Flight Systems and Space directorates.

Holmes began his NASA career in 1977. Much of his technical background has involved basic and applied aerodynamics research. He was leader of the Viscous Drag Reduction Research Group before serving as head of the Flight Research Branch, Flight Applications Division, from 1986 to 1989. In this position he directed the NASA program on natural laminar flow drag reduction technology, as well as the NASA F-106 Vortex Flap Flight Research program on high-lift systems for supersonic aircraft.

– more –

From 1987 to 1989, Holmes led a team of Langley researchers in the study of generic hypersonic subscale flight research, called HYpersonic Flight and Instrumentation REsearch (HYFIRE). This effort defined the critical hypersonic technical problems requiring access to flight and developed the approaches to experiment design, instrumentation, payload launching and recovery.

Holmes was detailed to NASA Headquarters from 1989 to 1990 as acting deputy director of the Aerodynamics Division in the Office of Aeronautics and Space Technology. There he was responsible for the overall direction, planning and advocacy for aerodynamics and aerothermodynamics research and technology programs. While at NASA Headquarters, he led the development and advocacy of a major expansion of NASA's research in advanced measurements technology. Holmes' efforts were instrumental in focusing national attention on the critical technical needs in the aeronautical community for research on future instrumentation devices and test techniques.

Before joining NASA, Holmes was a commuter and instructor pilot for Lawrence Aviation Inc.; he also served as a project test pilot and engineer for Roskam Aviation and Engineering Inc., Lawrence, Kan. He was an instructor and research assistant at the University of Kansas.

Holmes earned his bachelor and master of science degrees in aerospace engineering, as well as a doctorate in engineering, from the University of Kansas, Lawrence.

The author or co-author of 70 technical publications, he is an associate fellow of the American Institute of Aeronautics and Astronautics (AIAA) and has served on AIAA technical committees. He is a member of Sigma Gamma Tau (national aerospace engineering honor society) and the Society for Automotive Engineers (SAE). He has four U.S. patents.

He has won numerous awards and honors, including the NASA Medal for Exceptional Engineering Achievement, the Arthur S. Fleming Award, the AIAA Aerodynamics Award and, most recently, the AIAA's Piper General Aviation Award in 1991.

Holmes and his wife, Connie, and their two sons live in Newport News, Va.

– end –

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Quick Look: Dr. John T. Batina, senior research scientist at NASA's Langley Research Center, has won the 1992 Lawrence Sperry Award from the American Institute of Aeronautics and Astronautics. The award is for Batina's contributions to the development and application of computational fluid dynamics methods and is presented yearly to a young person who has advanced aeronautics and astronautics. Batina is a senior research scientist in Langley's Unsteady Aerodynamics Branch and is leader of the Computational Fluid Dynamics Development Group. He has been with Langley since 1983. Batina is a graduate of Purdue University.

RELEASE NO. 92-17

NASA LANGLEY SCIENTIST WINS SPERRY AWARD

Dr. John T. Batina, senior research scientist at NASA's Langley Research Center, has won the 1992 Lawrence Sperry Award given by the American Institute of Aeronautics and Astronautics (AIAA). The award is for "outstanding contributions to the development and application of computational fluid dynamics methods for the prediction of unsteady transonic aerodynamics and aircraft aeroelastic response."

The award is named after Lawrence B. Sperry, a pioneer aviator and inventor, and is presented yearly for a notable contribution made by a young person to the advancement of aeronautics and astronautics.

Since 1990, Batina has been a senior research scientist in Langley's Unsteady Aerodynamics Branch, where he is also leader of the Computational Fluid Dynamics Development Group.

– more –

Batina joined Langley in 1983 as a research scientist. Prior to that, he was a graduate teaching assistant from 1979 to 1983 and a graduate research assistant from 1981 to 1983 at Purdue University's School of Aeronautics and Astronautics.

Batina has won numerous other honors and awards and is the author of more than 100 publications in computational fluid dynamics, unsteady aerodynamics, aeroelasticity and structural dynamics. He is a senior member of the AIAA and a member of Tau Beta Pi, Phi Kappa Phi and Sigma Gamma Tau.

Batina is a graduate of Purdue, where he earned a bachelor of science degree in aeronautical and astronautical engineering, a master of science degree in aeronautics and astronautics and a doctorate from the School of Aeronautics and Astronautics.

– end –

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RELEASE NO. 92-18

QUICK LOOK: Dr. Ralph Muraca, chief of the Systems Engineering Division at NASA Langley Research Center, has received the rank of Meritorious Executive in the Senior Executive Service for his outstanding contributions to the management of NASA programs. Muraca, who began his NASA career in 1962, is a graduate of the Drexel Institute of Technology, the University of Virginia and the VIrginia Polytechnic Institute and State University. Muraca and his wife, Sandra, live in Poquoson.

LANGLEY'S SYSTEMS ENGINEERING CHIEF WINS PRESIDENTIAL RANK AWARD

Dr. Ralph Muraca, chief of the Systems Engineering Division, has been named a recipient of the Presidential Rank Award. He received the rank of Meritorious Executive in the Senior Executive Service (SES) for his outstanding contributions to the management of NASA programs.

A reception and dinner will recognize award recipients February 26 at Bolling Air Force Base, Washington, D.C.

Muraca, in his 30-year career at Langley, has provided outstanding leadership to an engineering and technical organization of 135 civil servants and 50 contractors supporting an array of aerospace research and development programs. Muraca's division has provided engineering support to numerous projects. On the space side, those include completition of the Halogen Occultation Experiment (HALOE), a satellite that is measuring gases that influence the climate; the Crew Equipment and Translation Aid (CETA) experiment for a 1991 Shuttle flight; and the recovery of the Long-Duration Exposure Facility (LDEF), a satellite the division designed to test the effect of space on various materials.

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In aeronautics, the division supported F-106 leading edge vortex flap development, which demonstrates the potential for improved fighter aircraft performance at low speed. Other support includes the B-757 Hybrid Laminar Flow Control project, which showed that a practical system to maintain smooth air flow over the wing could be installed on an aircraft and decrease fuel consumption; and completion of the first phase of the B-737 wind shear detection project, a NASA/Federal Aviation Administration program to develop technology for the early detection and avoidance of hazardous wind shear and heavy rain conditions.

Muraca began his NASA career at Langley in 1962 as a member of the Engineering Analysis Section. He has authored or co-authored about 20 technical publications. He is an associate fellow of the American Institute of Aeronautics and Astronautics.

In 1981, Muraca received the NASA Exceptional Service Medal. He attended the Brookings Institute program, the Federal Executive Institute, the Senior Executive Program and the Harvard University Program for Senior Executive Fellows.

Muraca received a bachelor of science degree in mechanical engineering from the Drexel Institute of Technology; a master's in aerospace engineering from the University of Virginia and a doctorate in aerospace engineering from the Virginia Polytechnic Institute and State University.

Muraca and his wife, Sandra, live in Poquoson.

– end –

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665-5225

1917 - 1992
75 Years
NACA
NASA
Langley
Research
Center

For Release:
February 25, 1992

Jean Clough
(804) 864-6122 (days)
(804) 898-5113 (evenings)

Michael Finneran
(804) 864-6126 (days)
(804) 627-5379 (evenings)

Quick Look: Sidney F. Pauls, associate director of NASA's Langley Research Center, has received the rank of Meritorious Executive in the Senior Executive Service (SES) for his contributions to the management of NASA programs. Only five percent of SES executives receive the award each year. Pauls, who has been with Langley since 1963, is a graduate of The College of William and Mary, George Washington University and the Massachusetts Institute of Technology Center for Advanced Engineering Studies and Harvard School of Business. He and his wife, Betty, live in Poquoson.

RELEASE NO. 92-19

NASA LANGLEY'S ASSOCIATE DIRECTOR RECEIVES PRESIDENTIAL RANK AWARD

NASA Langley Research Center Associate Director Sidney F. Pauls has been selected as a Presidential Rank Award recipient. He received the rank of Meritorious Executive in the Senior Executive Service (SES) for his substantial contributions to the management of NASA programs. Each year only five percent of SES executives may receive this award.

Award recipients will be honored at a reception and dinner February 26 at Bolling Air Force Base in Washington, D.C.

Pauls has made many significant management and administrative contributions to the Center and the Agency during his 29-year career at Langley. In 1979, he led an inter-Center study team that analyzed the Agency's processes for providing Headquarters visibility into the management of each Center's resources. Many of the team's recommendations were adopted and remain in use today.

– more –

Pauls was temporarily assigned to NASA Headquarters twice and to another Center once. In a 1980 assignment, he served as the deputy director of the Administration and Program Support Division in the Office of Aeronautics and Space Technology.

In 1987, he spent a year at Johnson Space Center in support of the Space Station Technical and Management Information System Source Evaluation Board (TMIS), where he chaired the management committee. After a successful evaluation, a $300 million contract was awarded. In 1988, Pauls spent five months at Headquarters as associate administrator for Headquarters Operations.

Pauls began his NASA career at Langley in 1963 as a resources analyst in the Manned Orbiting Laboratory Studies Office. He has served as branch head, chief of the Personnel Division and chief of the Business Data Systems Division. In his present position, he is involved in all aspects of management at the Center, which has an annual budget of about $500 million and employs some 3,000 civil servants and more than 2,000 contractors. Paul's duties including planning, directing and evaluating programs; formulating and executing policy; developing and directing administrative and technical support functions; and providing representation to top NASA management and other government agencies, industry, universities and the public.

Pauls has a bachelor of administration degree in economics from The College of William and Mary, a master of science degree in engineering management from George Washington University and was the recipient of a one-year fellowship at the Massachusetts Institute of Technology Center for Advanced Engineering Studies and Harvard School of Business.

He received the NASA Exceptional Service Medal in 1986. He is a member of the American Institute of Aeronautics and Astronautics, serving on the finance committee. He is an assistant professorial lecturer at George Washington University, where he teaches graduate courses in engineering economic analysis and engineering management.

He and his wife, Betty, live in Poquoson.

– end –

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665-5225

1917 - 1992 75 Years NACA NASA Langley Research Center

For Release:

June 10, 1992

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Release No. 92-59

NASA UNDERWATER TESTS TO SIMULATE SPACE ANTENNA ASSEMBLY

NASA engineers are preparing to do the first assembly of a large-scale, parabolic (double-curve) antenna in a huge water tank whose buoyancy lets researchers simulate working in the microgravity environment of space.

Some future space antennas will be too big to fit inside a space vehicle, so they will have to be assembled in Earth orbit from smaller panels attached to a supporting framework.

This month's tests in the Neutral Buoyancy Simulator at NASA's Marshall Space Flight Center, Huntsville, Ala., will help establish assembly times for such antennas, evaluate work procedures and task coordination and check the compatibility of the hardware itself.

The 50-foot dish to be used in the underwater study mimics the primary reflector of a new type of Earth-observation instrument. The dish surface is divided into 37 six-sided segments that will be mounted on a 315-piece support structure.

The pieces fit together to make a honeycomb-like surface pattern. On an orbiting satellite, the segments would form a precise reflector that could pick up electromagnetic energy radiated from Earth and distribute it to various sensors. The larger the dish surface, the more accurate the measurements become. NASA's Langley Research Center, Hampton,Va., leads the effort.

The underwater tests will include construction of the reflector support structure, attachment of seven reflector panels each about 7 feet in diameter and the removal and

- more -

reconnection of a panel to simulate repair activities.

Space-suited engineers from Langley will play the role of astronauts working in Earth orbit. They will erect the truss structure from individual stick-like members by manually joining them with Langley-designed and developed quick-connect joints similar to hardware tested on the recent STS-49 Space Shuttle mission.

During the simulation, one "astronaut" will remove the truss members and joints from canisters, while the other assembles the pieces into the truss. After part of the truss has been built, the test subjects will reorient their foot restraints and attach a series of reflector segments.

The mockup will be assembled on a fixture anchored to the bottom of the water tank. The fixture will support and move the truss during its construction and position the engineers as they move the footpads.

Researchers estimate that it will take about 3 hours to build the reflector mockup. The experience gained during this test will lead to refinements in precision reflector hardware being developed at Langley Research Center. NASA also is working on ways to create large space antennas using deployable structures, as well as by robotic and robot-assisted assembly.

Scientists will use precision reflectors to study the structure and origin of the universe and to improve understanding of environmental and climatic changes occurring on Earth.

- end -

NOTE: STILL PHOTOGRAPHS AND A 4-MINUTE VIDEO CLIP ARE AVAILABLE UPON REQUEST.

NASA News

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Space Administration

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1917 - 1992
75 Years
NACA
NASA
Langley
Research
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For Release:
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RELEASE NO. 92-63

NOTE TO EDITORS: NASA LANGLEY TO CELEBRATE ITS 75TH ANNIVERSARY

Dear Editor/Reporter:

On Friday, July 17, 1992, NASA Langley Research Center in Hampton, Virginia, will celebrate seven and a half decades of aerospace accomplishments. On July 17, 1917 Langley became the nation's first civilian aeronautical laboratory. Since then Langley has been on the forefront of air and space flight. Celebratory events to be held in the NASA Langley Hangar on July 17 will include:

•Unveiling of anniversary painting by renowned space artist Robert McCall
•Anniversary video
•75th anniversary logo formed by 1600 NASA employees for aerial photograph
•Technical exhibits
•Aircraft display from each decade

If you have an interest in covering this event please contact the NASA Langley Office of Public Affairs. We hope that you will join us.

America's manned space program began at Langley, and the Center has been involved in many well-known air and space projects, from breaking the sound barrier to the landing of men on the moon, the Viking lander on Mars, the Space Station Freedom, and the pioneering technology of the Space Shuttle. The Center is currently applying its massive technological capabilities towards the National Aero-Space Plane, and the study of the Earth's fragile atmosphere.

We are also prepared to help you develop an article on our 75th anniversary or on other aspects of the Center's work that may interest you. Enclosed is our feature release for background information. Our anniversary offers an excellent opportunity to highlight the country's progress in air and space through the prism of the research on whose foundation NASA was built. We can offer contact with our engineers, scientists, and administrators at all levels. Press kits, photographs, videos, fact sheets and other media materials are also available upon request.

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The members of Langley's Office of Public Affairs are available to assist you:

Δ Cam Martin, manager, Office of Public Affairs
(804) 864-6121

Δ Keith Henry, public affairs specialist for aeronautics
(804) 864-6120

Δ Jean Clough, public affairs specialist for space
(804) 864-6122

Δ Michael Finneran, editor, Langley newspaper
(804) 864-6126

• Follow-up note to editors announcing further events and guest speakers for July 17 to be released in late June.

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75th ANNIVERSARY FEATURE RELEASE

Exploring NASA's Roots
THE HISTORY OF NASA LANGLEY RESEARCH CENTER

We are rapidly approaching the dawn of a new century, the 21st, and a new millennium, the third in the Christian era. In the last hundred years humankind has moved from the dim glow of the first electric light bulb to the cold cloud of the superconductor, from the clatter of the steam-powered railroad locomotive to the roar of the supersonic jet airliner. In the last thousand we have progressed from the water wheel to the fusion reactor, from the ox-cart to the Space Shuttle. Only a clairvoyant could have forseen the course of our development. It will take an even bolder visionary to imagine where we shall end up 100 years from now, let alone 1,000. Our rate of change, already invisibly rapid, seems only to be picking up.

In the field of aerospace technology the developments of the next century should be spectacular. The regularly scheduled flights of supersonic airliners and hypersonic aircraft capable of flying in and out of the atmosphere should enable the peoples of the world to join together on a veritable global village. No spot in the world should be farther away than two hours traveling time--or perhaps even less. There should be permanent outposts on the Moon. We should visit Mars and venture out to even more remote bodies of the solar system.

New scientific discoveries will change radically our understanding of the universe and our place in it. Perhaps signs of other life in the universe will be discovered.

All of these things might very well happen in the "Second Century" of powered flight. If

-more-

they do, it will be because the next generations of aerospace scientists and engineers will be standing, in Isaac Newton's words, on the shoulders of giants.

This NASA Facts explores the history of NASA Langley Research Center in Hampton, Virginia, this country's first civilian aeronautics laboratory. Several major episodes in the epic story of American aerospace have their roots in the research contributions made by Langley since its establishment in 1917. The following is a brief synopsis of Langley's most historically significant achievements.

BACK TO THE DAYS OF NACA

Today's National Aeronautics and Space Administration (NASA) was established in 1958, but its historical roots reach back much farther, to 1915. In that year, 12 years after the Wright Brothers' flight and two years before American entry into World War I, the U.S. Congress created the National Advisory Committee for Aeronautics, or NACA.

In 1915 the airplane was still largely a useless freak. Much had to be done to transform it into a practical and versatile vehicle. The NACA's mission was "to supervise and direct the scientific study of the problems of flight with a view to their practical solution." This meant that the NACA was to treat aeronautics not so much as a scientific discipline, but as an area for engineering research and development. In practice this turned out to mean that the NACA would perform basic research that provided 'practical solutions' to serious problems facing the aircraft industry and the military air services.

Although established in 1915, the NACA did not have operational laboratory facilities

until 1920, when Langley came on line with its first primitive wind tunnel. Construction of Langley Field actually began in 1917, but the chaos of mobilizing for war in Europe delayed completion of the NACA's facilities for three years.

Once in possession of effective experimental equipment, however, the laboratory pursued its mission with distinction. Already by the end of the 1920s, with its ingeniously designed Variable-Density Tunnel, Propeller Research Tunnel, and Full-Scale Tunnel, which outperformed any other single collection of facilities anywhere in the world, NASA Langley was generally acknowledged to be the world's premier aeronautical research establishment. Thanks to the reliable data resulting from intelligent use of Langley's unique complex of experimental equipment, American aircraft began to dominate the world's airways.

Through systematic aerodynamic testing, NACA researchers found practical ways to improve the performance of many different varieties of aircraft. During World War II, they tested virtually all types of American aircraft that saw combat. By pointing out ways for these aircraft to gain a few miles per hour or a few extra miles of range, their effort in many cases made the difference in performance between Allied victory and defeat in the air.

After the war, NACA researchers turned their attention to the high-speed frontier and solved many of the basic problems blocking the flight of aircraft to supersonic speeds. They played essential roles in the development of several experimental high-speed research airplanes including Bell's X-1, the first plane to break the sound barrier, and the North American's X-15, the first winged aircraft to fly into space.

The NACA flourished as a federal agency until the autumn of 1958, when it was formally

abolished. In truth, however, much about the NACA lived on. Its laboratories and their staffs, although reorganized, formed the nucleus for the new space agency. The rest is history--NASA history.

THE SPACE FRONTIER

Although its name changed in 1958 from NACA Langley Aeronautical Laboratory to NASA Langley Research Center, the mission of its staff members remained constant: to increase the country's knowledge and capability in a full range of aeronautical disciplines and in selected space disciplines.

In the early 1960s Langley helped give birth to the space age. Project Mercury, the nation's inaugural man-in-space program, was conceived and managed initially from Langley. Spearheading this effort was the Center's Space Task Group, a special force of NASA employees that later expanded and moved on to become the Manned Spacecraft Center (now Johnson Space Center) in Houston. Before their move to Texas, however, they led the original seven astronauts (Shepard, Grissom, Glenn, Carpenter, Slayton, Schirra, and Gordon) through the initial phases of their spaceflight training at Langley.

NASA Langley went on to make several essential contributions to the Mercury, Gemini, Apollo, and Skylab manned programs. A thoughtful group of engineers at the Center proved the feasibility of lunar-orbit rendezvous (LOR). Without the articulation of this successful mission concept, the United States may have still landed men on the Moon, but it probably could not have happened as soon as it did, before the decade of the 1960s ran out, as President Kennedy

had proposed.

Spaceflight simulators designed and operated at the Center gave NASA's astronauts the experience they needed to pilot their fragile craft through the many difficult challenges of rendezvous and docking in space and landing on the Moon. The high-resolution photographic maps of the lunar surface made by NASA Langley's Lunar Orbiters made it possible to select the best sites for the landings of the Apollo and Surveyor spacecraft, and thereby learn more about the nature of the Moon.

Early unmanned space projects involving considerable creative effort by NASA Langley researchers included the Echo, Explorer, and PAGEOS satellites, all of which gave outstanding service as instruments for scientific research and global communications.

A solid-fuel rocket developed at the Center, the Scout, provided NASA with its lowest-cost, multipurpose booster. With it, a great number of precious payloads were launched into orbit. The first Scout was launched in July 1960.

In the wake of the Apollo came Viking. In an effort that in many ways matched and even surpassed the magnitude and adventure of the lunar landing program, NASA Langley helped to send two orbiters and two landers in the mid-1970s to the planet Mars. Although probes did not result in any definitive answer to the question of whether life exists (or has ever existed) on the mysterious red planet, Viking nonetheless provided a wealth of valuable scientific information.

In response to a growing concern in the late 1960s for protection of our environment, Langley researchers began to develop effective means by which to measure the Earth's oceans and continents, and detect the presence of dangerous pollutants. This effort in environmental

space science quickly became a major research thrust at the Center. Its goal has been to preserve the Earth's precious ecological balance and prevent an environmental calamity that would have disastrous effects for the entire world. Today at Langley this critically important undertaking is part of what former NASA astronaut Sally Ride has called "Mission to Planet Earth."

An important contribution to this "mission" includes Langley's Halogen Occultation Experiment (HALOE), an atmospheric satellite deployed by the Space Shuttle in 1991. Its overall goal is to provide global-scale data on temperature, ozone, and other key trace gases needed to study and better understand the chemistry, dynamics and radiative processes of the middle atmosphere.

Langley researchers had thought about "space planes" since the early 1950s. They had pioneered the concept of the boost glider and provided basic concepts for the development of the X-15, America's first hypersonic transatmospheric vehicle. So it was natural for them to become deeply involved in the development and testing of NASA's Space Shuttle. Even before it could be test flown in 1977 (its first orbital flight took place in 1981), the Shuttle had to be put through thousands of hours of wind tunnel testing and other rigorous experiments. Much of this was done at Langley. Furthermore, Langley was responsible for optimizing the design of the Shuttle's thermal protection system, the unique arrangement of ceramic tiles that protect the reusable vehicle from the intense heat of reentry.

To complement the Space Shuttle system and provide assured manned access to space for the next generation of space programs, Langley has conceived the HL-20 lifting body as a candidate for the Personnel Launch System (PLS). This system was designed for the primary

mission of changing the Space Station Freedom crews.

Visions of space stations orbiting the Earth had captured the imaginations of many Langley researchers as well. Long before plans for today's Space Station Freedom got under way, NASA scientists and engineers at the Center had understood the advantages of a manned laboratory in space for scientific experiments, for communications, for astronomical observation, for manufacturing, and as a relay base for lunar and planetary missions, and many other purposes. Excited by the thought of a multipurpose laboratory, they began to explore the problems of designing such a facility and operating it in Earth orbit. This early brainstorming and testing has provided a solid basis for NASA's development of Space Station Freedom. Today Langley employees continue to investigate the technologies that will be necessary for the design and operation of the Space Station, as well as for other large space structures.

One such step was the deployment and retrieval of the Long Duration Exposure Facility (LDEF), which was conceived, designed and developed at Langley. The bus sized satellite carried 57 space experiments to gather scientific data and to test the effects of long-term space exposure on spacecraft materials, components and systems. The wealth of information collected during its six-year journey will be invaluable for the design of future spacecraft.

CONTINUING A TRADITION OF EXCELLENCE IN AERONAUTICS

With deep roots going back to the golden age of aviation, Langley Research Center never forgot that the first "A" in NASA stood for "aeronautics." Although its achievements in aeronautics were sometimes overlooked in favor of the glories and wonders of spaceflight, NASA

Langley not only maintained its historic position as a world leader in aeronautical research it actually built and improved upon it.

During the 1960s Langley scientists and engineers put in a mammoth, Apollo-like effort in support of the government's proposed, but later cancelled, construction of a national supersonic transport or SST. Concurrently, they explored the potential of the variable-sweep wing and other aerodynamically and structurally novel wing shapes both for the SST and for advanced performance military aircraft.

Noteworthy breakthroughs in aeronautics have included the improvement of vertical takeoff and landing (VTOL) capabilities; the design of the 'supercritical wing' for more effective flight at high subsonic speeds; the enhancement of laminar flow in the boundary layer of a wing; and the refinement of energy-efficient engines and fuels. All of these research efforts--with the exception of SST, which was cancelled by the U.S. Congress in 1971--continued to yield valuable results into the 1970s and 1980s.

But even the supersonic work did not really come to an end. From the early 1970s on, Langley managed to keep alive a low-level but determined program to develop the technologies required for the effective flight of a supersonic transport. By the mid-1980s, there was a renewed interest at the Center in the development of an American SST. According to estimates, new technologies, including those developed at NASA Langley, now make an SST a much better bet.

In the 1970s Langley also kept the dream of hypersonic flight alive. This effort, which has important links back to studies made at Langley as early as the 1950s, now finds application

in the National Aero-Space Plane (NASP). The focus of this program, in which Langley is the lead Center for its development, is to create the technology base for an entirely new family of aerospace vehicles capable of flying at high Mach numbers to the edges of the atmosphere and beyond. Under this program a single-stage-to-orbit flight vehicle, known as the X-30, might be flying by the end of this century.

Langley has participated in too many significant aeronautical programs, in support of too many civilian and military aircraft development programs, to describe all of them in detail. The following list of selected programs--some completed in past years, some ongoing--should be enough to exhibit the value of the Center's wide-ranging aeronautical studies.

X-15 Program
Hypersonics
Lifting Bodies
Supersonic Cruise Aircraft Research
Quiet Engine Research
Vertical Short Takeoff and Landing Research
Aircraft Energy Efficiency
Advanced Turboprop
Composite Materials
Crash Dynamics
Forward Swept Wing
Automated pilot Advisory System
Stall Spin Research
Advanced Controls
Rotor Inflow Research
Laminar Flow Control
Windshear
CRT's in Cockpits
Drag Reduction Studies-WW II

Historically, Langley researchers have found it beneficial to study these topics both in wind tunnels and other ground-based experimental facilities as well as in the actual flight test

of aircraft. From the start, Langley's outstanding record in aerospace research has depended on creative use of basic research tools. Over the years Langley has built and operated an array of sophisticated facilities that collectively have not been outproduced by any other of the world's premier aeronautical research establishments. Many of its wind tunnels have been unprecedented. The U.S. Department of Interior has designated five of Langley's facilities as National Historic Landmarks.

WHERE THE PAST ONCE WAS...THE FUTURE IS NOW

From the Curtiss Jenny to the Beech Starship and X-29, from the drone of propellers to the roar of rockets and jets, from wind tunnel generating a maximum airflow speed of 90 miles per hour to tunnels generating Mach 8, from flight a few hundred feet above the ground to flight in space, Langley Research Center has been incubating the ideas and hatching the technology that has helped Americans take off and fly. Today, penetrating minds continue to pursue that mission at Langley. Tomorrow? Well, no one can be sure what tomorrow will bring. But based on what we know about Langley's record, one can rest assured that, where the progress of flight is concerned, NASA Langley Research Center will be exploring all the possibilities.

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The following photos accompany this release and are available from the Office of Public Affairs:

1. North American P-51 Mustang in the Full Scale Tunnel
   B&W LMAL 34590

2. Wind Tunnel #1
   B&W NACA 4

3. Variable Density Tunnel
   B&W NACA 2-3-22

4. Project Mercury's Little Joe launch vehicle
   B&W L-60-104

5. NASA's Seven Original Astronauts
   B&W, Color L-71-2971

6. Gemini Rendezvous Docking Simulator
   B&W, Color L-64-1609

7. Lunar Excursion Module Simulator
   B&W, Color L-67-3179

8. Echo Communications Satellite
   B&W, Color 61-4597

9. Scout Launch Vehicle
   B&W, Color L-88-0939

10. Viking 2 Lander on Mars
    B&W, Color P-18296

11. Space Shuttle model in 16-Foot Transonic Tunnel
    B&W, Color L-783478

12. HL-20 Lifting Body
    B&W, Color 90-118-C

13. Long Duration Exposure Facility retrieval
    B&W, Color S32-85-63

14. National Aero-Space Plane computer generated image
    B&W, Color L-91-16,132/3

15. North American X-15 in wind tunnel
    B&W LAL 57-4346

16. Langley Impact Dynamics Facility crash test
    B&W, Color L-79-4525

17. Lockheed Air Express with NACA cowl
    B&W 3,271

-more-

BASIC CHRONOLOGY

- 1915 Creation of the National Advisory Committee for Aeronautics (NACA), Langley's first parent organization.

- 1917 Foundation of the NACA's Langley Memorial Aeronautical Laboratory (LMAL) and start of construction on original facilities.

- 1920 Formal dedication of LMAL; operation of first wind tunnel.

- 1948 Name shortened to Langley Aeronautical Laboratory (LAL).

- 1958 Dissolution of NACA and foundation of National Aeronautics and Space Administration (NASA); name changed to Langley Research Center.

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LANGLEY'S NATIONAL HISTORIC LANDMARKS

In 1985 the U.S. Department of Interior designated five Langley facilities as National Historic Landmarks. Each facility made a unique and outstanding historical contribution to American achievements in flight technology.

Name of Facility	Year Built
Variable-Density Tunnel	1921
Full-Scale Tunnel	1930
8-Foot High-Speed Tunnel	1935
Rendezvous Docking Simulator	1963
Lunar Landing Research Facility	1965

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LANGLEY DIRECTORS

In all of Langley history there have been only seven directors. Until 1948 this officer, Langley's top man, was known by the descriptive title, "Engineer in Charge."

Leigh H. Griffith	(1922-1925)
Henry J.E. Reid	(1926-1960)
Floyd L. Thompson	(1960-1968)
Edgar M. Cortright	(1968-1975)
Donald P. Hearth	(1975-1985)
Richard H. Petersen	(1985-1991)
Paul F. Holloway	(1991-)

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COLLIER TROPHIES

Although NASA Langley has been honored to receive a number of national awards and international distinctions, over the years many have considered one award, the Robert J. Collier Trophy, to be the most prestigious. Awarded annually for the greatest achievement in American aviation, the Collier Trophy has been awarded to Langley researchers on five occasions. The trophy, first awarded in 1911, is named for Robert J. Collier, a prominent publisher, patriot, sportsman, and aviator.

Langley's Collier Trophies:

1929 for the low-drag engine cowling

1946 for de-icing research

1947 for supersonic flight research

1951 for the slotted throat transonic wind tunnel

1954 the transonic area rule

-end-

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23665-5225

1917 - 1992 75 Years NACA NASA Langley Research Center

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LANGLEY STORY OPPORTUNITIES — JUNE 1992

WINDSHEAR. By year's end 1993, all commercial aircraft must have onboard windshear detection systems, according to an FAA mandate. Toward that end, Langley's Wind Shear Program Office has been testing several forward-looking windshear sensors. In 1991, two sensors were flight-tested: Doppler radar and an infrared light system. More flight tests are planned for August-September 1992 in Orlando, Fla., with those two systems plus a third additional one: laser-based lidar. Langley has also developed a sophisticated "hazard index" to make sense of the incoming sensor data for display in the cockpit. Stills and video available.
Public Affairs Public Affairs contact: Michael Finneran, (804) 864-6126.

ORBITAL ACCELERATION RESEARCH EXPERIMENT (OARE): A Langley orbiter acceleration instrument will fly on Columbia during STS-50 in June. The Orbital Acceleration Research Experiment (OARE) provides measurements of orbiter aerodynamic data within the thin atmosphere of extreme altitudes. Aerodynamic data is acquired on orbit and during the high-altitude portion of atmospheric entry. The OARE instrument is installed for flight at the bottom of the orbiter's payload bay on a special carrier plate attached to the orbiter's keel. Photo available.
Public Affairs contact: Jean Clough, (804) 864-6122

MAX FAGET, GUEST LECTURER: Space flight pioneer, Max Faget, will discuss Langley's transition in the '50s as the space age dawned. Faget, an original member of the Space Task Group formed at Langley, will speak at a NASA Langley colloquium Monday, June 8. His talk will focus on some of the more important activities at Langley during the years leading up to the creation of NASA to replace NACA.
Public Affairs contact: Jean Clough, (804) 864-6122

MEATBALL: The NASA meatball, created in the '50s, is back! It replaces the current logo, the "worm" (the NASA logo atop this page).
Public Affairs contact: Jean Clough, (804) 864-6122

-more-

LDEF: The Second Long Duration Exposure Facility (LDEF) Post-Retrieval Symposium, sponsored by Langley and the American Institute of Aeronautics and Astronautics, will be held June 1-5 in San Diego. The analysis of the 57 experiments and flight hardware has revealed information about man-made space debris, meteoroids, radiation, contamination, biology, materials and systems exposed for a long duration in space. The agenda includes concurrent sessions in these areas as well as general sessions with invited review papers and future directions for LDEF. Abstracts will be available at the symposium and symposium proceedings will be printed later.
Public Affairs contact: Jean Clough, (804) 864-6122

75th ANNIVERSARY CELEBRATION: To celebrate seven and one half decades of aerospace accomplishments, Langley plans a weekend of activities, starting with a 75th Anniversary ceremony in the Hangar on July 17. A highlight will be the unveiling of anniversary painting by space artist Robert McCall. Also featured will be technical exhibits and a static display with aircraft from each decade. After the ceremony, Langley's 75th logo will be formed behind the Hangar by employees for an aerial photograph. A Langley 75th Anniversary video will also be shown, followed by a reception.
Public Affairs contact: Keith Henry, (804) 864-6120.

HALOE SETS LANGLEY STANDARD FOR PYROTECHNIC QUALIFICATION: Following functional failures of a pin puller design planned for use on the Halogen Occultation Experiment (HALOE), an investigation and redesign was conducted. The existing state-of-the-art approach for pyrotechnic qualification is to put a design together and "see if it works." The HALOE approach was to determine the effects of functional variables, using dynamic test conditions comparable to actual firings, and to measure the performance of the explosive energy source. Thus, for the first time in NASA's history, functional margin was determined for pyrotechnically actuated device. Photographs available.
Public Affairs contact: Keith Henry, (804) 864-6120 or Kristina Murden, 864-8150.

NATIONAL HISTORIC LANDMARK: The Lunar Landing Research Facility (LLRF) and the Lunar Excursion Module Simulator (LEMS) will be dedicated during June (date to be determined). The LLRF was designated a National Historic Landmark, one of five at Langley, in 1985. Langley's landmarks--the Variable Density Tunnel, the Rendezvous and Docking Simulator, the 8-Foot High-Speed Tunnel, the Full-Scale Tunnel and LLRF--are among 26 sites selected nationwide for inclusion in the Department of the Interior's "Man in Space" project, which was conceived to preserve the posterity of the NASA sites that most contributed to America's successful manned flight programs between 1915-1972. Photos available.
Public Affairs contact: Ann Suit, (804) 864-3305.

PROJECT FIRE: The second major cloud radiation research project led by Langley will be June 1 when the Center's Dave McDougal takes an international cast of hundreds to the Eastern Atlantic region between the Azores and Madeira Islands. McDougal will once again serve as project manager for the NASA-sponsored field experiment called the Atlantic Stratocumulus Transition Experiment (ASTEX). The project is a major component of project FIRE (First ISCCP Regional Experiment).
Public Affairs contact: Craig Murden, (804) 864-3296.

THE SUPERCRITICAL WING (SCW) research plane is a Navy Vought F8U (later renamed F-8A) Crusader fighter that had its wing replaced with a SCW. The SCW solved the transonic problem of shock waves occurring across the wing when the aircraft approaches supersonic speeds. Dryden initiated the program for the development of the SCW, and Langley's Dr. Richard Whitcomb designed it. The initial flights of the F-8 were recognized with a series of special events for Dryden's 20th anniversary on May 26 and 27. The plane has been restored and displayed at Dryden Flight Research Facility in Edwards, California. Photos, a video and a press release available.
Public Affairs contact: Whitney Bartlett, (804) 864-6176.

WIDE-SCREEN DISPLAY IS DYNAMIC COCKPIT RESEARCH TOOL. Rapid advances in computer graphics have made possible new large-screen, integrated stereo pictorial formats to increase pilot and aircraft performance, increase safety, and provide for significant operational benefits. Langley is experimenting with a 15-inch high by 40-inch wide cockpit display screen in a ground simulator. Features include a high-definition display, multiwindow capability and quick change formats. This unique research tool is being used to assess pilot situation awareness. Eventual cockpit applications include advanced subsonic transports and in possibly windowless advanced supersonic transports. Photos available. Public Affairs contact: Keith Henry, (804) 864-6120.

"EASY-TO-FLY" AIRCRAFT CONCEPT. Why shouldn't flying an airplane be as simple as driving a car? That is the question being pursued in a modest ongoing research effort at Langley. In simulator tests with non-pilots, the average person can "fly" a light airplane after only 30 minutes of instruction with the help of an onboard microcomputer and software that makes flying "user friendly." In the tests, ground-bound pilots simply move the control stick forward if they want the airplane to speed up, for instance, without having to simultaneously adjust other control surfaces to keep the airplane from gaining altitude. The computer, given a command, makes all necessary adjustments. Stills and video interview available.. Public Affairs contact: Keith Henry, (804) 864-6120.

-end-

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665-5225

1917 1992 75 Years NACA NASA Langley Research Center

For Release:

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RELEASE NO. 92-92 June 25, 1992

INTERNATIONAL OZONE SYMPOSIUM DRAWS 10 LANGLEY SCIENTISTS

LATEST VOLCANO FINDINGS AMONG TOPICS PRESENTED

Langley's broad contributions to atmospheric science were showcased when 10 Center scientists delivered key papers at the 1992 Quadrennial Ozone Symposium held June 4-13 at the University of Virginia. The gathering brought authorities from the world's concerned nations to share research data, exchange views and to seek new perspective about the complicated role of ozone in the future of the planet's health.

Among the newest research findings presented were the two Mt. Pinatubo-related papers by Dr. William B. Grant whose most recent findings shed new light on what effect the volcano's eruption is having on stratospheric ozone. Grant's measurements with balloon-borne sensors suggest that significant ozone decreases may have occurred as a result of the injection of debris by the volcano in June 1991. Together with simultaneous satellite measurements, the balloon data show a maximum difference observed before and after the eruption of 18 to 20 percent.

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Langley presentations at the symposium demonstrated the Center's wide-ranging commitment to atmospheric research led by Dr. James D. Lawrence Jr., head of the Atmospheric Sciences Division. The Langley contributions included treatments of how airborne Light Detection and Ranging (LIDAR) measured tropospheric ozone variability and polar stratospheric ozone depletion. Two papers were given by Dr. Edward V. Browell, head of the LIDAR Applications Group. Next, Dr. Jack Fishman discussed his extensive use of satellites in analyzing trends in the variability of tropospheric ozone, and Jennifer L. Richardson covered an investigation of the impact of biomass burning on tropospheric ozone at low latitudes.

Later in the symposium, Dr. James M. Russell III, head of the Theoretical Studies Branch, highlighted results from the Langley-developed Halogen Occultation Experiment (HALOE), launched on the Upper Atmosphere Research Satellite (UARS) in 1991. Related to that work, Dr. Jae H. Park explained effects of the Mt. Pinatubo volcano aerosol layer on the HALOE results. Then, the head of the Aerosol Research Branch, Dr. M. Patrick McCormick, treated trends in global stratospheric ozone as related to both altitude and latitude. Other presenters were Dr. Martin G. Mlyncza, heating processes in the middle atmosphere; Dr. Brian J. Connor, ISAMS measurement of ozone; and Khan M. Fakhruzzaman, large scale circulation of tropospheric ozone.

The symposium was sponsored by a variety of agencies, among them the Environmental Protection Agency, NASA, National Oceanic and Atmospheric Administration, National Science Foundation, Virginia Space Agency and World Meteorological Organization.

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23665-5225

1917 - 1992
75 Years
NACA
NASA
Langley
Research
Center

For Release:

July 1992

RELEASE: 92-99

LANGLEY SEVENTY-FIFTH ANNIVERSARY STORY OPPORTUNITIES -- JULY 1992

It was on July 17 -- 75 years ago -- that ground was broken for the Langley Memorial Aeronautical Laboratory. As the nation's first civilian aeronautical lab, Langley was to become the eventual foundation of NASA. Langley and its people played the role of pioneer by helping create the tools and by training the engineers, scientists, technicians, managers and leaders who made aerospace history throughout this century. And, today, Langley continues this tradition of aerospace leadership and remains a dynamic, productive, unique national research facility. Opportunities for telling the rich and varied Langley story upon the occasion of its 75th Anniversary are many.

75th ANNIVERSARY CEREMONY: A July 17 ceremony will formally mark Langley's 75th Anniversary. Featured will be technical exhibits and a static display of aircraft from each decade since 1917. Other highlights include the unveiling of 75th Annversary commemorative artwork and the premier of a 29-minute documentary. After the ceremony, Langley's 75th logo will be formed behind the hangar by employees for an aerial photograph.
Public Affairs contacts: Keith Henry, (804) 864-6120 or Kristina Murden, (804) 864-8150

AIRCRAFT FROM CURTISS JENNY TO BEACH STARSHIP ON DISPLAY. Each of Langley's seven and one half decades of contributions to flight will be represented by one or more aircraft on display during the Center's 75th Anniversary Ceremony July 17 (see previous item). Aircraft flying in for the program include a WWI era Curtiss Jenny replica, antique classic aircraft like the Ercoupe, Monocoupe and Vagabond and modern aircraft such as the Glasair II, Cirrus VK30, F-15, Cessna Citation III and a Beech Starship. Several remotely-piloted vehicles will also be on display.
Public Affairs contact: Keith Henry (804) 864-6120

- more -

LANGLEY HISTORIAN SPEAKS. In a special Langley Colloquium July 16, science and technology historian Dr. James R. Hansen will reflect upon seven and one half decades of aerospace accomplishments. Hansen's talk, "A Flight Through 75 Years of Langley History," will be held at 2 p.m. in the H.J.E. Reid Conference Center, 14 Langley Boulevard. Hansen, a history professor at Auburn University in Alabama, is the author of *Engineer in Charge: An Institutional History of Langley Aeronautical Laboratory, 1917-1958."* His is writing a history of NASA Langley from 1958 through 1975. Hansen was a distinguised lecturer of the American Institute of Aeronautics and Astronautics for 1986-87.
Public Affairs contact: Jean Clough, (804) 864-6122

SPECIAL EAA AIR SHOW & CONVENTION PROGRAM. Langley will be honored for 75 years of aeronautics and space achievements by the Experimental Aircraft Association (EAA) at their annual fly-in and convention Saturday night, Aug. 1, in Oshkosh, Wisc. Several Langley aviation pioneers will be recognized as part of the program. Paul Holloway, Langley Center Director, will accept an award on behalf of the Center from EAA President Tom Poberezny.
Public Affairs contact: John Burton, EAA (414) 426-4829

COMMEMORATIVE ART TO BE UNVEILED. A 6 1/2- by 19-foot-long 75th Annversary commemorative artwork will be unveiled at the Center's 75th Anniversary ceremony July 17. The work was painted for Langley's 75th Anniversary by reknowned aerospace artist Bob McCall. Entitled "Expanding the Frontiers of Flight," the colorful painting depicts a few of the hundreds of aircraft to which Langley has contributed technology. Also illustrated are a wind tunnel, an astronaut and future space projects like the National Aero-Space Plane and a Space Station. Planetary exploration is represented by images of the Lunar lander that was key to the first manned landing on the Moon and by a Martian landscape, reminscient of the Langley-led Viking mission to Mars. After the painting is unveiled, it will be displayed in the new Virginia Air & Space Center in downtown Hampton, Va.
Public Affairs contact: Keith Henry (804) 864-6120

FAMILY SPANS THE HISTORY OF FLIGHT. Dr. Jack Bacon, an aerospace engineer working on Space Station Freedom at NASA Johnson Space Center, Houston, Texas, tells a fascinating story of how his grandfather and grandmother met and worked at the fledgling Langley Memorial Aeronautical Laboratory in the earliest days of the lab. Dr. Bacon's grandfather (David L. Bacon) was Langley employee number 8, working at Langley from 1920-24. As a young engineer, he worked on a variety of pioneering projects including as a member of the design team for one of the first pressurized wind tunnels in the world. His grandmother (Grace Elizabeth Dunlap) was the second woman to come to work at Langley and served as a mathematician. She followed her friend, Pearl Young, Langley's first woman employee.
Public Affairs contact: Keith Henry (804) 864-6120

RESOURCES TO HELP TELL THE LANGLEY 75th STORY

75th ANNIVERSARY PRESS KIT. A good "starter kit," complete with selected photographs and information items. Call us for your own kit.
Public Affairs contact: Keith Henry (804) 864-6120

FEATURE LENGTH ARTICLES. Two articles are available. Illustrations include an extensive variety of aeronautics and space images, plus line art of Langley's 75th Anniversary logo. The first article, "The History of NASA Langley Research Center," is a 2000-word feature written with the layman in mind. The second article, "First Century of Achievement: An Historical Update," is a 4500-word decade-by-decade treatment also written for the general reader.
Public Affairs contact: Keith Henry (804) 864-6120

FACT SHEETS. Several comprehensive written summaries tell interesting bite-sized parts of the Langley story. Each have illustrations and captions. They include:
"Exploring NASA's Roots," 12pp. Excellent short summary of LaRC's history, with quick-look sidebars.
"Langley National Historic Landmarks," 8pp. Outlines Langley's five national historic landmarks and the contribution of each.
"The Mustang Story: Recollections of the XP-51," 8pp. Retired Langley pilot Jack Reeder tells of flight testing the famous U.S. fighter which first used the NACA laminar airfoil. Reeder is still very active and available as a resource (see "Interview Opportunities, Living Legends," below).
"Testing the First Supersonic Aircraft: Memoirs of NACA Pilot Bob Champine," 12 pp. Langley NACA pilot in the "right stuff" era breaking the sound barrier in the desert and flying at Langley. Champine is available as a resource (see "Interview Opportunities, Living Legends," below).
"Langley Contributions to Spaceflight," 12 pp. Overview of Langley's contributions to manned and unmanned spaceflight.
"Langley Contributions to Apollo," 8 pp. A good short summary of Langley's contributions to the nation's push to be the first to the Moon, starting with the earliest days of the Mercury program.
"Lunar Orbit Rendezvous," 8 pp. Chronicles how the darkhorse candidate concept for getting to the Moon eventually won out over direct ascent and the part key people played. The Lunar orbit concept was important to getting to the Moon before the end of the decade and perhaps Langley's greatest contribution to the Apollo program.
"Scout Launch Vehicle Program," 2 pp. Scout is a simple, inexpensive, highly-successful launch vehicle developed by Langley that pioneered a methodical launch preparation strategy.
"Langley Contributions to the Space Shuttle," 2 pp. Outlines Langley's many research and technology contributions to the Space Shuttle.
Public Affairs contact: Keith Henry (804) 864-6120

VIDEO NEWS RELEASE. A quick-moving 3-minute capsulization of the Langley story from the earliest days to the present. With narration. Available in Betacam, 3/4" or VHS.
Public Affairs contact: Keith Henry (804) 864-6120

"PICTURES IN THE MIND": (EMBARGOED UNTIL JULY 17) This 29-minute PBS-style documentary commemorates 75 years of aeronautics and space achievements by the Langley Research Center. In 1917 Langley became the nation's first civilian aeronautical laboratory. Since then the Center has been in the forefront of air and space flight. The video dramatically presents the machines of flight and how these aircraft and spacecraft have defined the Twentieth Century. Viewers will meet the people behind the story, the Langley men and women who dreamed the dreams of flight and made them real. Available in Betacam, 3/4" or VHS.
Public Affairs contact: Jean Clough, (804) 864-6122

INTERVIEW OPPORTUNITIES. Interviewee candidates include more than a dozen living aerospace legends -- researchers, aerospace leaders and pilots -- that spent part or all of their careers at Langley during dramatic turning points in aerospace history. Their careers parallel Langley's greatest accomplishments over the years. Stories range from urgent studies of aircraft fighter drag reduction during World War II to breaking the "sound barrier" to the race to the Moon to supersonic transport design studies.
Public Affairs contact: Keith Henry (804) 864-6120

75th ANNIVERSARY BOOK. *"Winds of Change"* 100+ pp. By James Schultz. Provides easy-to-read overview of NASA Langley's contributions to aeronautics and space over its 75-year history. Includes interviews with premier researchers who have made outstanding contributions. Approximately half text, half photographs. Many B/W photos plus full color photographs. Measures 10 inches wide by 12 inches long. Author is available for interview. To be released later this summer. Book to be sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
Public Affairs contact: Keith Henry (804) 864-6120

NASA News

National Aeronautics
and Space Administration

Langley Research Center
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Release No. 92-102

Dear Editor/Reporter:

In July and August of 1992, NASA's Langley Research Center will flight-test advance-warning sensors that are being developed to detect windshear, a hazardous weather condition that has been blamed for hundreds of airline fatalities. This NASA and Federal Aviation Administration program will very shortly result in the installation of windshear warning systems on all commercial aircraft.

Because the program ultimately will make the skies safer for all airline passengers, it may be of interest to your audience. A media package follows this note, and interviews, graphics, photos and videos also are available. If you have any questions, please call and we will be glad to assist.

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Release No. 92-102

MAKING THE SKIES SAFE FROM WINDSHEAR
Langley To Flight-Test Advance-Warning Sensors

NASA's Langley Research Center is gearing up for its first flight tests, in July and August, of a laser-based sensor designed to give airline pilots advance warning of the sometimes-fatal weather condition known as windshear.

Langley scientists and engineers also expect the flights to provide additional data on other airborne windshear sensors tested last year.

Windshear, a hazard particularly during takeoff and landing, can force a plane to lose airspeed and altitude and has been blamed for hundreds of airline deaths. Putting advance-warning sensors on planes will give pilots time to avoid the treacherous downdrafts and wind changes.

Under strict safety criteria, flight tests will carry a NASA 737 research aircraft at low altitude directly into thunderstorms and other severe weather conditions to seek out the violent windshear "microbursts."

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The flights will originate from Denver, Colo., and Orlando, Fla. The Denver deployment will take place from July 13 to 27. The Orlando flight tests will take place from early August through early September. During the deployments, the 737 research plane will be directed toward microbursts using experimental ground-based Doppler radar designed to spot windshear.

The flight tests are part of a more than $20-million research agreement signed in 1986 between NASA and the Federal Aviation Administration (FAA). The agreement calls for the development of technology for airborne windshear detection and avoidance, and the 737 flights are the final phase of the joint program.

Looking forward

Under a 1988 FAA directive, windshear detection devices are being installed on airplanes to meet a year-end 1993 deadline. But those systems do not detect windshear until a plane already has entered it — possibly too late to prevent a crash.

By contrast, the forward-looking remote sensor systems being test-flown by Langley can detect windshear from 15 to 40 seconds in advance, allowing time for avoidance maneuvers. The FAA has mandated that this type of windshear-warning system be installed on commercial aircraft by 1995.

Langley is testing three types of forward-looking systems:

• The laser-based system, called Doppler "LIDAR" (light detecting and ranging) measures the speed of aerosols—minute particles in the air, such as dust—as an indicator of changes in the wind. Langley will flight-test this system for the first time this summer.

• Another system uses microwave radar to locate microbursts by measuring sudden, large changes in the speed of raindrops in storm cells ahead of the airplane.

• Another system uses an infrared light sensor, which detects microbursts by measuring air temperature differences ahead of the aircraft.

The flights also will test a Langley-developed data link between ground weather radar and the 737. Researchers are developing a system for automatically transmitting windshear data from ground radar to a display in airplane cockpits. Currently, warnings from ground weather radar usually are relayed by voice — a slower and less precise method.

COLOR PHOTOS & VIDEO AVAILABLE

• The **video** (VHS or broadcast-quality Beta) is a compilation that includes a reenactment of a windshear-caused crash, with cockpit voices; time-lapse footage of a windshear microburst forming and hitting the ground; footage of NASA's 737 research aircraft flying through two windshear events; filler footage of the 737 taking off, landing, cockpit chatter and instrument closeups; and a 10-minute documentary.

• For **glossy color prints** of the photos in the fact sheets, order by "L" number:

Four-page fact sheet:
- Page 1 - L-90-1643
- Page 2 (top) - L-91-9964
- Page 2 (bottom) - L-91-1645
- Page 3 (top) L-92-386
- Page 3 (bottom) - L-89-11777
- Back page: L-92 - L-92-6965

One-page fact sheet:
- Page 1 - L-91-10089
- Back page - L-92-6965

• Other **photos** also are available and show: thunderstorm from airplane window; NASA's 737 research aircraft on runway with thunderstorm sky; and colorful computational fluid dynamics (computer-generated images) of windshear microbursts.

• **To order** photos or video, call (804) 864-6126 or 6120.

LANGLEY'S WIND SHEAR PROGRAM OFFICE

- Dr. Roland Bowles, manager.
- Michael S. Lewis, deputy manager.
- John J. White II, ATOPS Program Office, Flight Management Division (FltMD).
- George G. Steinmetz, ATOPS Program Office, FltMD.
- Dick Yenni, forward deck pilot, Aircraft Operations Branch (AOB), Flight Applications Division (FAD).
- Harry Verstynen, forward deck co-pilot and head, AOB, FAD.
- Lee H. Person Jr., research cockpit pilot, AOB, FAD.
- Emedio M. Bracalente, Antenna & Microwave Research Branch, Guidance and Controls Division.

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NASA Facts

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INSIDE

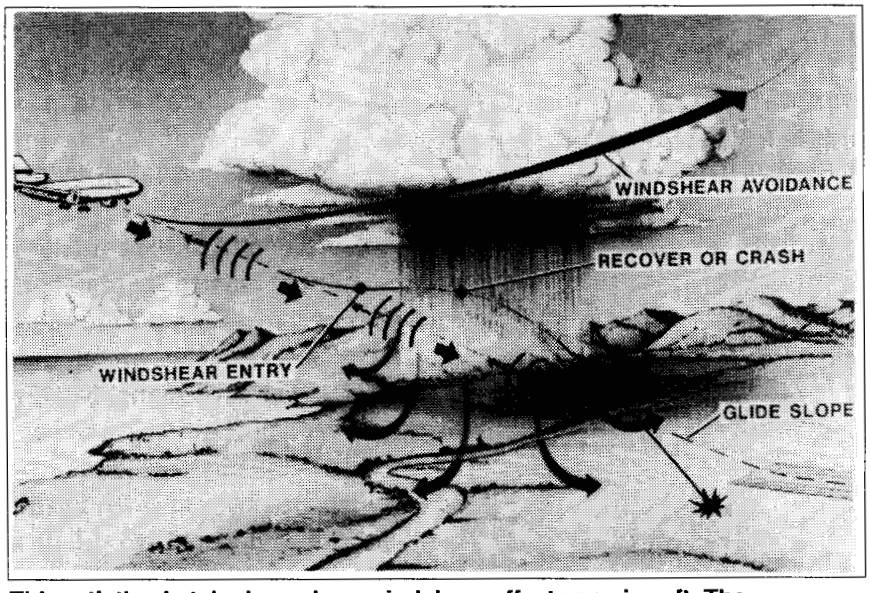
- The three types of windshear sensors.
- What the FAA says airlines must do, and when.

NF176 - June 1992

Making the skies safe from windshear

Langley-developed sensors will help improve air safety

NASA's Langley Research Center is part of a joint NASA and Federal Aviation Administration (FAA) effort to develop technology for the airborne detection of windshear, a hazardous weather condition that has been blamed for the loss of hundreds of lives in airplane crashes.



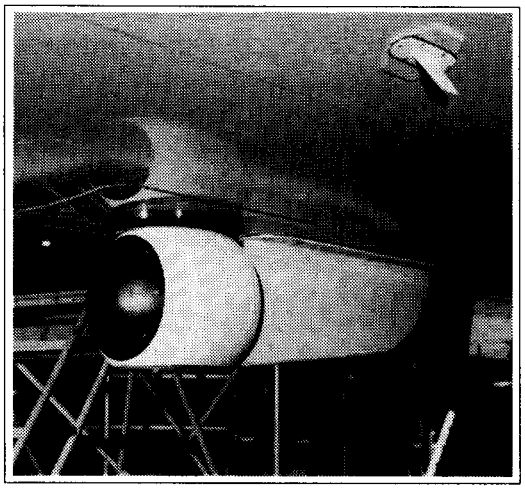
This artist's sketch shows how windshear affects an aircraft. The downbursts are a danger to planes primarily during takeoff and landing.

■ Reducing danger: studies now in flight-test stage

Windshear studies at Langley started in 1986 with analysis, moved to simulation and now are in the flight-test stage. This effort was prompted by fatal accidents in New York in 1975, New Orleans in 1982 and Dallas-Fort Worth in 1985. About 500 fatalities and 200 injuries have resulted from windshear crashes involving at least 26 civil aircraft between 1964 and 1985. Since 1985, windshear also has caused numerous near accidents in which aircraft recovered just before ground contact.

■ Windshear and how it affects an airplane

Windshear is a generic term referring to any rapidly changing wind currents. A type of weather phenomenon called "microbursts" can produce extremely strong windshear, posing great danger to aircraft. These are local, short-lived downdrafts that radiate outward as they rush toward the ground. As a downdraft spreads down and outward from a cloud, it creates an increasing headwind over the wings of an oncoming aircraft. This headwind causes a sudden leap in airspeed, and the plane lifts. If the pilots are unaware that this speed increase is caused by windshear, they are likely to react by reducing engine power. However, as the plane passes through the shear, the wind

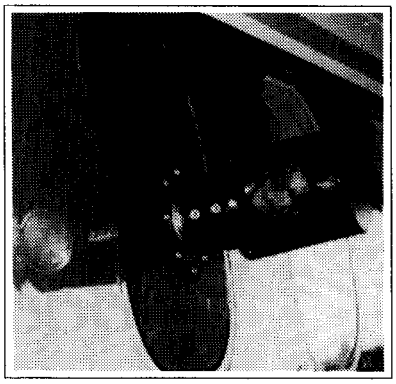


The LIDAR sensor is mounted in the belly of the 737 research aircraft.

moving cars, etc.—and thus has fewer interfering signals. However, it does not work as well in heavy rain. The system is made by Lockheed Corp.'s Missiles and Space Co., Sunnyvale, Calif.; United Technologies Optical Systems Inc., West Palm Beach, Fla.; and Lassen Research, Chico, Calif.

Infrared: Uses an infrared detector to measure temperature changes ahead of the airplane. The system monitors the thermal signatures of carbon dioxide to look for cool columns of air, which can be a characteristic of microbursts. This system is less costly and not as complex as others, but does not directly measure wind speeds. This system is made by Turbulence Prediction Systems in Denver, Colo.

■ Windshear-alert systems using ground-based radar



The infrared sensor is located on the side of the 737.

A Low-Level Wind-Shear Alert System has been installed on the ground at more than 100 U.S. airports. Wind speed and directional sensors report to a central computer, and controllers can alert pilots in the event windshear is detected. But the systems cannot predict when windshears are approaching. However, a ground-based radar (Terminal Doppler Weather Radar) system has been tested at Orlando, Fla., and Denver Stapleton airports and is scheduled to be stationed at more than 40 other airports by mid-1994. Even with such systems installed, however, airborne detection will still be needed because windshear is a global phenomenon—and most airports will not have predictive, ground-based systems installed.

■ FAA mandate: Airlines must install windshear sensors

In 1988 the FAA directed that all commercial aircraft must have onboard windshear detection systems by the end of 1993. Three—American, Northwest and Continental—received exemptions until the end of 1995 in order to install and test predictive windshear sensors rather than "reactive" systems that do not report the condition until an airplane already has encountered it.

■ NASA and the FAA: Working together for a solution

Langley's flight tests are the most recent step in a government/industry effort to produce a database on microbursts and detection systems. The effort began in 1986, when NASA and the Federal Aviation Administration (FAA) agreed to work together to develop methods of detecting and avoiding hazardous windshear. The NASA/FAA joint effort is a response to congressional directives and National Transportation Safety Board (NTSB) recommendations following documentation of numerous windshear accidents. The FAA created a flight safety program and supported NASA development of windshear detection technologies. The data gathered from analyses, simulations, laboratory tests and flight tests will help the FAA certify predictive windshear detection systems for installation on all commercial aircraft.

quickly becomes a downdraft and then a tailwind. This reduces the speed of air over the wings, and the extra lift and speed vanish. Because the plane is now flying on reduced power, it is vulnerable to sudden loss of airspeed and altitude. The pilots may be able to escape the microburst by adding power to the engines. But if the shear is strong enough, they may be forced to crash.

The cockpit of Langley's 737 research aircraft displays windshear data prior to penetrating a microburst.

■ Greatest danger: Takeoff and landing

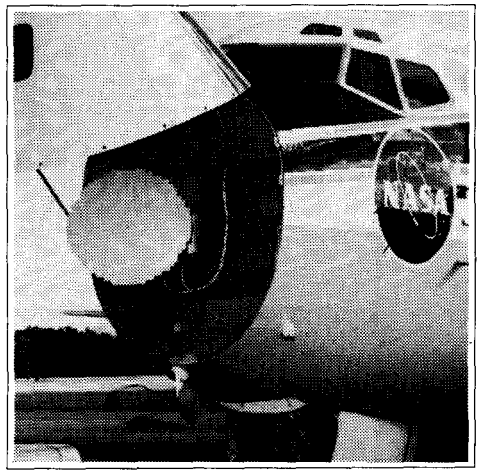
Windshear poses the greatest danger to aircraft during takeoff and landing, when the plane is close to the ground and has little time or room to maneuver. During landing, the pilot has already reduced engine power and may not have time to increase speed enough to escape the downdraft. During takeoff, an aircraft is near stall speed and thus is very vulnerable to windshear.

■ "Wet" and "dry" windshear

Microburst windshear often occurs during thunderstorms. But it can also arise in the absence of rain near the ground. Some of the sensor systems that Langley is flight testing work better in rain, while others perform more successfully during dry conditions.

■ Three airborne predictive windshear sensor systems

Pilots need 10 to 40 seconds of warning to avoid windshear. Fewer than 10 seconds is not enough time to react, while more than 40 is too long—atmospheric conditions can change in that time. Three systems are being flight-tested to give advance warning of windshear:



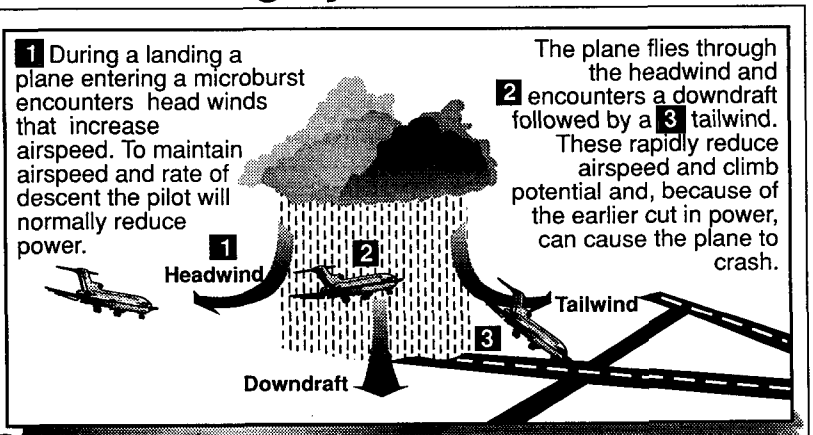
The microwave radar sensor is in the nose of the 737.

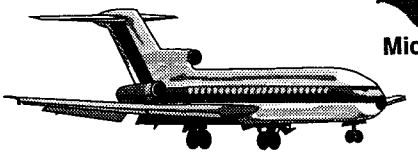
Microwave radar: Sends a microwave radar signal ahead of the aircraft to seek raindrops and other moisture particles. The returning signal represents the motion of those raindrops and moisture particles, and this is translated into wind speed. Microwave radar works better than other systems in rain but less well in dry conditions. Because it points toward the ground as the plane lands, it picks up interfering ground returns, or "clutter." However, researchers are progressing in efforts to eliminate this interference. The radar transmitter is made by Rockwell International's Collins Air Transport division in Cedar Rapids, Iowa. NASA's Langley Research Center has developed the research signal-processing algorithms and hardware for the windshear application.

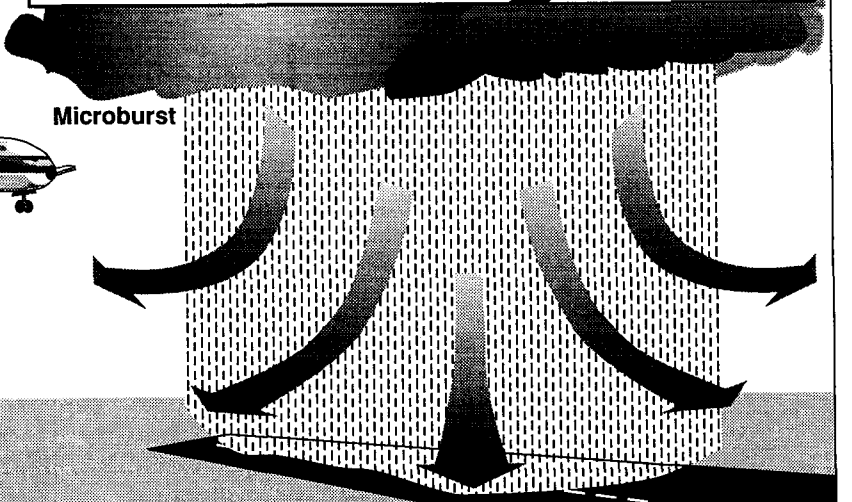
Doppler LIDAR: A laser system called Doppler LIDAR (light detecting and ranging) reflects energy from "aerosols" (minute particles) instead of raindrops. This system can avoid picking up ground clutter—

Onboard windshear warning systems

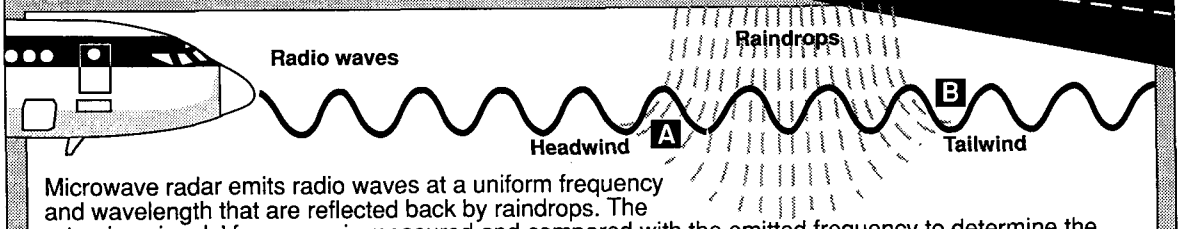
A microburst is a weather pattern that can create windshear. This condition has been linked to commercial plane crashes, especially during takeoffs and landings. Researchers feel that a 15- to 40-second warning will allow pilots to deal with this hazard. NASA Langley and the FAA are working on a variety of airborne detection and early warning systems. They include onboard microwave radar, infrared and LIDAR systems.







Microwave radar



Microwave radar emits radio waves at a uniform frequency and wavelength that are reflected back by raindrops. The returning signals' frequency is measured and compared with the emitted frequency to determine the direction and speed of the raindrops. A Doppler reading of varying wavelengths can indicate a wind shear condition.

A The raindrops borne by headwinds return a shorter wavelength.

B The raindrops borne by tailwinds return a longer wavelength.

Infrared

A small, relatively inexpensive system used to measure infrared radiation, which we feel as heat. A sensor measures the changes in temperature in front of a plane. These changes can be an indication of wind gusts. The sensor would activate a warning light in the cockpit.

LIDAR

LIDAR, short for Light Detecting and Ranging, uses light waves in the form of a laser beam much like Doppler radar uses radio waves. Instead of measuring the speed of raindrops, it measures the speed of aerosols and dust particles in the atmosphere to detect changes in the wind.

Sources: NASA Langley, KRTN, Chicago Tribune, Daily Press

NASA Facts

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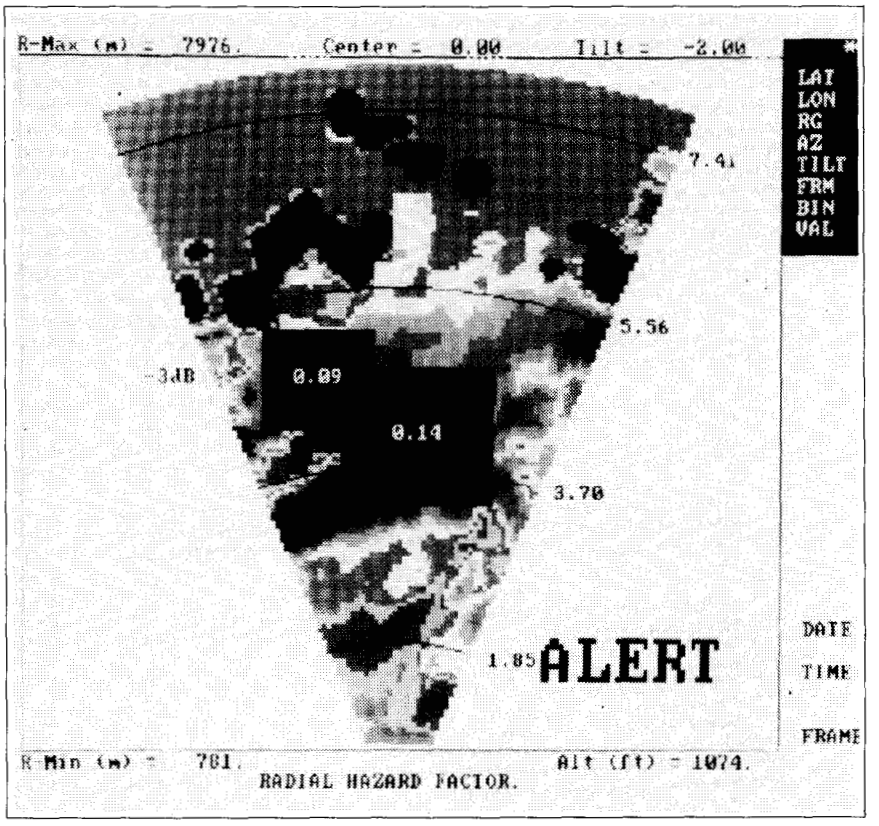
NF177 - June 1992

The Hazard Index: Langley's 'F-factor'

Cockpit display tells pilots degree of danger posed by windshear ahead of plane.

For the information provided by windshear sensors to be meaningful, a hazard index has been developed by NASA's Langley Research Center. This index indicates the level of danger posed by windspeed changes that have been detected.

The index is displayed in the cockpit as an "F-factor" number, which, simply put, is a measure of the loss in rate-of-climb capability that would result from flying into a windshear. The higher the F-factor, the greater the hazard. A valuable feature of this system is the ability to preset a hazard threshold to automatically alert the crew of a microburst.



This display in the research cockpit of Langley's 737 aircraft is flashing the location and intensity of two microbursts two to three miles ahead. The plane's position is at the bottom of the cone. One of the microbursts measures 0.09 — just shy of what is considered a hazard (0.105). The other, at 0.14, is a confirmed hazard.

■ How danger is measured

The hazard index, which works with both airborne and ground-based sensors, determines the danger level of a microburst by synthesizing information about both the aircraft and atmospheric conditions at, and ahead of, the plane. Taken into account is a wealth of data, such as aircraft speed, engine thrust, drag, weight, altitude, flight-path angle and horizontal and vertical wind velocity.

Hazard criteria are based on Langley's analysis, flight tests, comparisons with windshear accident reconstructions and case studies of inadvertent encounters with severe windshear. As a result, hazardous windshear is considered to exist when the average F-factor exceeds 0.105 over a one-kilometer segment along an aircraft's flight path. This is equivalent to the loss of about 1,500 feet-per-minute climb capability over nearly 15 seconds of flight time.

NASA LANGLEY RESEARCH CENTER
Office of Public Affairs

9/21/92
To: 106/Director
102/ Deputy Director
103/ Associate Director
Thru: 115/Head, Office of External Affairs
From: 115/Head, Office of Public Affairs

Subject: Dr. Hansen's Sequel to *Engineer in Charge*

Gary Price asked me to follow up with a note to respond to your question about the period covered by Jim Hansen's next book.

The working title is :
**"The Spaceflight Revolution at NASA Langley:
From the Sputnik Crisis to the First Lunar Landing"**

It picks up where Engineer in Charge leaves off, and continues thru mid-1969 documenting the Apollo 11 landing and the Cortright reorganization at Langley. As Jim began to research the Center's early NASA history, it "jelled around the concept of the spaceflight revolution." He saw this as a distinct period in our history which lasted approximately a decade. It contained many things which deserved entire chapters of their own like Lunar Orbiter and Scout. He concludes with the Cortright reorganization because it was a dramatic event in lab history and also because it provided a meaningful terminal point.

When Jim thought of going beyond 1969, he realized that the post-Apollo era represented an entirely new epoch-- which would cause big stories like Scout to be treated merely as sub-chapter headings. In the end, he decided to confine his work to the 60s because it was such a critical decade.

As an observation, "contemporary history" tends to lag far behind what many would typically expect. The exact amount of "seasoning" required to objectively study a subject varies-- but 25 to 50 years seems to be the norm. Historians are very wary of the "corrupting influence of current events". As an example, aerospace historians are just now beginning to talk of when they will begin to study the history of the Shuttle program. They have enough documents to work from, but feel they may need another ten years to get enough distance to make an objective, scholarly analysis.

We are very pleased that you have decided to retain Jim Hansen as Langley's historian. He is an invaluable resource for our office who makes many routine contributions that significantly enhance the quality of our work. There are a number of significant history projects that we would like to tackle with Dr. Hansen's help.

ORIGINAL SIGNED BY
Cam Martin
46121

cc: Dick Layman

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1917 - 1992 75 Years NACA NASA Langley Research Center

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For Release:

RELEASE NO. 92-121 September 24, 1992

Quick Look: NASA Langley Research Center in Hampton, Va. receives the prestigious international R & D 100 Award. *Research and Development* magazine selected LaRC-RP46, a less toxic family of polymers, as one of the 100 most significant technological advancements of the year. It was developed at Langley by Dr. Ruth H. Pater, senior polymer scientist in the Materials Division.

NASA Langley Honored for New Family of Polymers

A less toxic family of polymers, developed in response to a need for a safer and easy-to-process high temperature plastic, is the winner of a prestigious international award.

Research and Development magazine selected this family of polymers, LaRC-RP46, as one of the 100 most significant technological advancements of the year. It was developed at NASA Langley Research Center in Hampton, Va. by Dr. Ruth H. Pater, senior polymer scientist of the Materials Division for the Structures Directorate.

LaRC-RP46 is a thermo-setting plastic, meaning it cannot be reshaped after reaching its cured temperature.

The product's primary function is to provide structurally efficient, advanced composite materials, which are very lightweight and have high strength and stiffness.

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The cost of LaRC-RP46's raw materials is comparable to the current industry standard, (PMR-15), but much lower than other newer matrix resins, which makes it the most cost-effective ultra high temperature matrix resin known.

This product has several improved characteristics that PMR-15 lacks: easy processing of its tougher and more flexible composites, an ability to retain its properties at a temperature as high as 371 C (or 700 F), greater resistance to microcracking and it is less toxic.

LaRC-RP46 has all of the important characteristics required for many high temperature applications. It is suitable for the High Speed Civil Transport, a future aircraft that will fly at more than twice the speed of sound. It can also be used in a variety of military and commercial aircraft engine components in which polymer matrix composite materials must operate at 500 F to 700 F for an extended period.

A small non-aerospace company, Plastics Technologies Industries, has licensed LaRC-RP46 for making large containers, each weighing as much as 700-800 pounds. The containers are intended for use in petroleum and marine industries in extremely corrosive environments.

Langley Research Center has earned 23 R&D 100 awards in its 25 years of competition. NASA ranks second on the list of R&D 100 award recipients. The awards banquet and exhibits program will be held Sept. 24, at Chicago's Museum of Science and Industry.

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NOTE: Photos and graphs available upon request.

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For Release:

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Kristina Murden
(804) 864-8150

RELEASE NO. 92-122 September 24, 1992

QUICK LOOK: NASA Langley Research Center in Hampton, Va., receives the prestigious international R&D 100 award for a device to improve helicopter safety. It was selected by *Research and Development* magazine as one of the 100 most significant technological advancements of the year.

NASA LANGLEY HONORED FOR HELICOPTER FLIGHT INNOVATION

Helicopters may fly safer thanks to an economical aerodynamic device that is the winner of a prestigious international award. For pilots, the "Helicopter Anti-Torque System Using Fuselage Strakes" may actually mean the difference between maintaining or losing control of a helicopter.

Developed at NASA Langley Research Center, in Hampton, Va., by John C. Wilson and Henry L. Kelley, the system was selected by *Research and Development* magazine as one of the 100 most significant technological advancements of the year. Its implementation offers an improvement particularly in right sideward flight, where a helicopter has the most potential to lose control and crash.

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When a helicopter operates at that condition at low flight speeds, the thrust required from the tail rotor for directional control is high, and sometimes beyond its capability. In gusty winds the pilot could possibly lose control and not be able to regain it with movement of flight controls, resulting in a spin and crash. This is when the new strake makes the difference. A strake is essentially a spoiler mounted perpendicular to the tail boom and is about one to three inches high. "The concept is important because it is beneficial at critical points of control," said Kelley.

A strake attached to the tail boom of a helicopter reduces the thrust required of the tail rotor by "spoiling" smooth air flow over the craft. The smooth flow primarily results from the rotor downwash and from crosswinds or sideward flight velocity. That flow and associated low pressure on the boom are replaced with turbulent flow and high pressure, thus adding to the thrust available so the craft can maintain control. "This increases the pilot's control by at least five percent when the controls are pressed to their limit," said Wilson. It also results in less wear and tear on the gear box, since the strakes reduce the power that has to go through it when the gears are to their limit. A second strake can be added to the lower side of the boom to improve efficiency of the upper strake.

The idea of using a strake to deal with yaw (directional) control was first suggested in a technical report by Wilson in 1975. This triggered a series of wind tunnel tests of helicopter models that showed that airloads on the tail boom of a helicopter were large at low flight speeds. Wilson and his team decided to change these airloads by disrupting the flow around the tail boom with a flow spoiler. Langley's 14-by 22-Foot Subsonic tunnel measured aerodynamic characteristics of tail booms with and without strakes, proving that significant benefits to

helicopters were possible if the strakes were implemented. Later, flight testing of helicopters with strakes demonstrated that directional control at low flight speeds was improved.

The strakes are currently used on the British Sea King, some civilian McDonnell Douglas Helicopters, and the French AS .350B; while kits are under development to upgrade some of the McDonnell Douglas Helicopter Company's Army special operations aircraft. The strakes can be easily, quickly and economically installed to most helicopters made in the U.S. They were patented in 1987 and first used on helicopters in 1991.

John C. Wilson and Henry L. Kelley are research aeronautical engineers employed by the U.S. Army Aeroflightdynamics Directorate at NASA Langley. NASA Langley has earned 23 R&D 100 awards in its 25 years of competition. NASA ranks second on the list of R&D 100 award recipients, and Langley was the only NASA Center to win this year. An awards reception will be held at Chicago's Museum of Science and Industry September 24, 1992.

-end-

NOTE: Photographs are available from the Office of Public Affairs, (804) 864-8150.

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For Release:

RELEASE NO. 92-128

August 27, 1992

NASA AND PHILLIPS LABORATORY COOPERATE ON JOINT TECHNOLOGIES

The NASA Langley Research Center signed an agreement recently with Phillips Laboratory, Kirkland Air Force Base, NM, to cooperate on critical technologies and research and development involving space systems and atmospheric sciences. The agreement will facilitate identifying cooperative efforts of mutual benefit.

Over the years, each organization has developed special capabilities and facilities which now could be supportive or complementary to the other. Both have common interests in space structures, electronics and sensors; spacecraft and launch vehicle design; and atmospheric studies.

Meetings will be held to discuss the progress of ongoing joint activities and to identify future joint programs.

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For Release:

RELEASE NO. 92-135

LANGLEY STORY OPPORTUNITIES — SEPTEMBER 1992

SOUTH AMERICAN/AFRICAN OZONE STUDY: Will investigate the chemical composition of the atmosphere over the Southern Tropical Atlantic Ocean and the adjacent South American and African continents. Called the South Tropical Atlantic Regional Experiment (STARE), it will focus on understanding a seasonal enhancement in ozone that has been observed in those areas. Transport and Atmospheric Chemistry Near the Equator – Atlantic, (TRACE-A) and Southern African Fire-Atmospheric Research Initiative (SAFARI) are two specific Langley experiments to be conducted in September. TRACE-A will look at global tropospheric chemistry and trace gases and the effects they have on the rapid changes occurring in the Brazilian and central African landscape. SAFARI will look at the impact of biomass burning on the world atmosphere. Computer enhanced art and interview candidates available. Public Affairs contact: Craig Murden (804) 864-3926.

WINDOWLESS COCKPIT -- SYNTHETIC VISION: In the future, airline pilots will not worry about poor visibility because of bad weather. In the more distant future, supersonic airlines may not even have cockpit windows. These things will be possible because of technology now being developed at Langley. "Synthetic vision," as it is called, will make use of new ways of sensing and displaying information in the cockpit – color, stereo 3-D images with clear, crisp graphics will fill a large screen in front of both pilot and co-pilot. One immediate advantage for designers of a future high speed civil transport: They can reduce cost and complexity by avoiding a "droop nose" hinged cockpit like that on the British-French Concorde. Still photos available. Public Affairs contact: Keith Henry (804) 864-6120.

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F-16XL WIND TUNNEL TESTS: The F-16XL four-percent scale model will be tested in Langley wind tunnels. Lasers will be used to illuminate flow patterns around the wing. Photographs and interview candidates available.
Public Affairs contact: Keith Henry (804) 864-6120.

WINDSHEAR FLIGHTS COMPLETED: Langley has completed the flight-test phase of three advance-warning sensors designed to detect deadly windshear microbursts, a weather condition that has been blamed in more than 500 airline deaths. The flights, aboard a specially outfitted NASA 737, took researchers through more than 50 microbursts, where they collected data that industry will use to develop commercial sensors. According to the Federal Aviation Administration, airlines that choose advance-warning sensors must install them by December 1995. Available are Beta and VHS video clips, photos, fact sheets and interview opportunities.
Public Affairs contact: Michael Finneran (804) 864-6126.

CONTROLLING FLEXIBLE SPACECRAFT: Future space platforms are expected to be larger than satellites now orbiting the Earth – perhaps as long as two or three football fields. They also are expected to be more flexible and have increasingly sensitive science instruments. The combination poses a problem and a challenge for spacecraft designers. At Langley, researchers are performing computer simulations and ground tests with a 50-foot-long spacecraft model. They are looking for structural concepts strong enough to limit unwanted movements yet light enough to be affordable. This knowledge will help in designing spacecraft intended for a variety of missions, including Earth observation missions later this decade. Still photos and a five-minute video are available.
Public Affairs contact: Jean Clough (804) 864-6122.

75TH ANNIVERSARY – LANGLEY OPEN HOUSE OCTOBER 17: The public is invited to help Langley celebrate its 75th anniversary with an open house Saturday, Oct. 17, from 9 a.m. to 4 p.m. Visitors will see flight simulators, laboratories, research aircraft, wind tunnels, advanced aerospace fabrication and a dozen different displays, including space exploration, future cockpits and windshear avoidance. Stills and video available.
Public Affairs contact: Keith Henry (804) 864-6120.

HL-20 LIFTING BODY SPACECRAFT: Researchers at Langley have produced computer simulations of the HL-20, a proposed taxi for moving personnel and small payloads between Space Station Freedom and Earth. Using computational fluid dynamics (CFD) tools in concert with today's most powerful supercomputers, researchers are able to predict the flow around the HL-20 at flight conditions, providing designers with valuable surface heating and pressure information. Three color computer graphics are available.
Public Affairs contact: Jean Clough (804) 864-6122.

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ADVANCED MANNED LAUNCH SYSTEM (AMLS): An AMLS model is being tested in the 7 X 10-Foot Wind Tunnel. This configuration is one concept for the next generation space shuttle. The work is part of the advanced vehicle program, dedicated to designing future spacecraft having improved performance and operations. A variety of configurations are being studied, such as this candidate orbiter, part of a two-stage configuration designed to be fully reusable and powered solely by liquid propellants. Other designs explore the use of airbreathing propulsion and expendable vehicles. Two computer-generated still graphics are available.
Public Affairs contact: Jean Clough (804) 864-6122.

NASA News

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1917 1992 75 Years NACA NASA Langley Research Center

For Release:

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(804) 864-8150

Keith Henry
(804) 864-6120

RELEASE NO. 92-136 October 1, 1992

NASA LANGLEY 75TH ANNIVERSARY OPEN HOUSE OCTOBER 17

NASA Langley Research Center will host an Open House to mark its 75th Anniversary on October 17, 1992, from 9 a.m. to 4 p.m. The event will feature tours of 15 facilities, air and spacecraft displays, test runs of the Aircraft Landing Dynamics Facility and more. This is the first time the Center has been open to the public in five years.

In the hangar, large scale models of the next generation of spacecraft will be on display, along with Langley's Long Duration Exposure Facility that orbited the Earth for six years. Models are of the National Aero-Space Plane and HL-20 "space taxi." The Boeing 737 "flying laboratory" recently back from windshear testing in Florida will also be on display with research and visiting aircraft.

Test runs at the Aircraft Landing Dynamics Facility will be conducted at 11 a.m. and 3 p.m., and Space Shuttle tires and runway surfaces will be on display at the facility along with several ground test vehicles.

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At the Impact Landing Dynamics Research Facility, formerly the Lunar Landing Research Facility during the Apollo program, an all-composite Lear Fan airframe being readied for a crash test and a B-707 fuselage section mounted in the drop tower will be on display.

Among the many other displays and tours are:

- Flight Simulation Research
- Robotics Laboratory
- Advanced Aerospace Fabrication
- Research Aircraft
- Space Structures Research Laboratory
- 14- by 22-Foot Subsonic Wind Tunnel
- 7- by 10-Foot High-Speed Wind Tunnel
- Unitary Wind Tunnel
- 31-inch Mach 10 Tunnel
- Atmospheric Science Research
- Acoustics Laboratory
- 30- by 60-Foot Tunnel

Shuttle buses including those accessible by the disabled will provide on-Center transportation for all visitors. Entry to the Center will be through the main gate or the Wythe Creek gate.

A two hour tour with sign language interpreters for the deaf will be available from 11 a.m. to 1 p.m. The bus will leave from the H.J.E. Reid Conference Center promptly at 11 a.m. For more information about this tour call (voice) 864-3973 or (TTY) 864-3920.

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NOTE TO EDITORS:
For more information, or if you would like to attend this event, please call the Office of Public Affairs 864-6124.

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For Release:

RELEASE NO. 92-137

September 23, 1992

SCIENCE EXPEDITION TARGETS NEW ATMOSPHERIC OZONE POLLUTION

More than 200 scientists from 13 countries are participating in a science expedition, spearheaded by NASA, to investigate newly discovered concentrations of harmful ozone over large regions of southern Africa and Brazil.

Believed linked to massive biomass burning on the two continents, the pool of ozone pollution was recently uncovered by satellite analysis. Biomass burning is the consumption by fire of forests or fields. Unlike stratospheric ozone, which is a critical shield against harmful ultraviolet radiation, ozone in the lower atmosphere is a pollutant.

Investigation of the new phenomenon will employ a variety of high-tech instrumentation including observations from satellites, aircraft and ground platforms. The field campaign, which began in mid-September, will extend through most of October.

In addition to satellite surveillance, NASA's DC-8 "flying laboratory" from the Ames Research Center, Mountain View, Calif., will participate. The Space Shuttle Endeavour, on

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N-2017

its September mission, photographed African and South American smoke palls to provide new visual perspective on the nature of the emissions.

The South American iinvestigation is a joint effort between the space agencies of the United States and Brazil. Satellites, specially instrumented Brazilian aircraft, the NASA DC-8 and balloon-borne sampling platforms will be used to address the source areas in central Brazil and track the long-range distribution of gases as they move into the southern tropical Atlantic.

The African portion of the experiment is a collaboration of European, African and North American scientists to investigate fires in savanna (grassland containing scattered trees and undergrowth) in southern Africa, movement of fires across that continent and the relationship between fires, savanna ecology and atmospheric chemistry. Measurements from ground, tower, balloon and airborne platforms will be integrated with data from the Brazilian investigation and with satellite observations.

Scientists in both projects acknowledge that the movements and chemical mechanisms of this ozone anomaly are extremely complex and that explanations up to this point have been speculative. These new investigations will be the first to provide concrete insights on the global impact of tropical biomass burning.

Some scientists believe the effects of emissions from the biomass burning on the atmosphere's chemistry are comparable to those from fossil fuels in the northern latitudes. The emissions from the burning undoubtedly have some effect on the Earth's climatic balance, but whether this could lead to net warming or cooling is still open to speculation.

Scientists should get a better understanding of the processes involved in these mechanisms when the data are analyzed and interpreted.

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For Release:

RELEASE NO. 92-142

LANGLEY STORY OPPORTUNITIES -- OCTOBER 1992

STORIED NASA RESEARCH PILOT HONORED: A NASA engineer and research pilot who test flew more than 200 different types of aircraft over a 40-year career will be honored by the Michigan Aviation Hall of Fame Nov. 7. Among his contributions, aviation pioneer John P. "Jack" Reeder helped develop the P-51 fighter, a highly successful U.S. fighter aircraft of World War II, the British Harrier fighter and modern advanced transport operating systems that have enhanced airport and runway capacity. Jack is available to reflect upon his career and the aircraft he has flown, including a few harrowing experiences as research pilot. Photos and interview opportunity available.
Public Affairs contact: Keith Henry (804) 864-6124

HELICOPTER SAFETY INNOVATION: Helicopters may fly safer thanks to an economical aerodynamic device that is the winner of a prestigious international award. For pilots, the "Helicopter Anti-Torque System Using Fuselage Strakes" may actually mean the difference between maintaining or losing control of a helicopter. The system involves mounting "strakes," or spoilers, to the tail boom of a helicopter. They reduce the thrust required by the tail rotor, thus helping the pilot maintain directional control in gusty winds. The strakes were chosen by Research and Development magazine as one of the 100 most significant technological advancements of the year. Photos and interview opportunities available.
Public Affairs contact: Kristina Murden (804) 864-8150

NEW FAMILY OF POLYMERS PATENTED: A less toxic family of polymers, developed in response to a need for a safer and easy-to-process plastic, was selected by Research and Development magazine as one of the

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100 most significant technological advancements of the year. The product will provide structurally efficient, advanced composite materials, that are lightweight and have great strength and stiffness. It is suitable for the future High Speed Civil Transport aircraft that will fly at more than twice the speed of sound. It can also be used in a variety of military and commercial aircraft engine components. Photos and interview opportunities available.
Public Affairs contact: Kristina Murden (804) 864-8150

75TH ANNIVERSARY – LANGLEY OPEN HOUSE OCTOBER 17: Langley continues to celebrate its 75th Anniversary by opening up its facilities to the public on Oct. 17, from 9 a.m. to 4 p.m. Guided tours through wind tunnels, flight simulators in action, and acoustics and robotics laboratories are among the day's events. The futuristic "space taxi," the National Aero-Space Plane X-30 mockup, and research aircraft will be there, with a dozen different displays including space exploration, future concepts and windshear avoidance. Buses will take visitors around the Center to 17 tour stops and 19 displays. Admission is free. Photos and video available.
Public Affairs contact: Keith Henry (804) 864-6124

FLEXIBLE WING DEVELOPER HONORED BY SMITHSONIAN: Retired Langley researcher Francis M. Rogallo will receive the National Air and Space Museum Trophy on October 16 for outstanding achievements in the fields of Aerospace Science and Technology. During a long and outstanding career as an inventor of aeronautical devices, Rogallo developed the flexible wing concept as a method for returning spacecraft to Earth. Although never adopted for this purpose, the flexible wing concept led to the development of the modern hang glider, which has made inexpensive recreational flight possible for thousands of people worldwide. Photos available.
Public Affairs contact: Kristina Murden (804) 864-8150

ANTARCTIC OZONE DEPLETION: Loss of protective ozone from the Earth's stratosphere over the Antarctic region may be greater than in recent years. The so-called ozone hole has once again been measured by NASA scientists using a satellite-borne platform. A manager in Langley's Atmospheric Science Division, an internationally recognized investigator of this phenomenon, is available to discuss preliminary findings.

Interview opportunities available.
Public Affairs contact: Craig Murden (804) 864-3296

NEW GLOBAL POLLUTION SOURCE PROBED: Langley participants in an international expedition to investigate a major new source of harmful ozone have returned to the Center. Senior scientists conducted ground and aircraft measurement of smoke generated by the burning of southern African grasslands. These polluting emissions, discovered far from normal industrial and automotive sources, are being examined for insights about the global impact of biomass burning. Other Langley atmospheric scientists are making complementary analyses in Brazil using satellite, airborne and ground-based measurement platforms. They will complete that work at the end of the month when measurement data from both continents will be compiled for an overall international assessment. Photos and interview opportunities available.
Public Affairs contact: Craig Murden (804) 864-3296

VOLCANO SCARS AIRLINE WINDOWS: A volcano's effect on airliner windows has been the subject of NASA Langley collaboration with the Boeing Company. Emissions from the 1991 eruption of Mt. Pinatubo in the Philippines caused clouding or crazing of plexiglass windows when commercial airliners flew through the residue. Interview opportunities available.
Public Affairs contact: Craig Murden (804) 864-3296

NASA LANGLEY CONTRIBUTIONS TO SPACE FLIGHT: A rocket has never been launched from nor has the Shuttle ever landed at this Hampton, Virginia, facility, but NASA Langley claims the title "birthplace of space flight." Langley researchers nurtured and fought for ideas, concepts and technologies that ultimately proved essential to the success of major crewed space projects like Mercury, Gemini, Apollo, Skylab and the Space Shuttle. They spearheaded major robotic exploration projects like Echo, Lunar Orbiter and Viking. And, they developed a reliable, low-cost, solid booster rocket, the Scout, that has put hundreds of scientific research payloads into orbit. Without the fundamental information about space flight that only a basic research organization like NASA Langley can provide, no space program--past, present or future--could hope to succeed. Photos available.
Public Affairs contact: Marny Skora (804) 864-3315

ISY EXHIBIT OPENS AT VIRGINIA AIR AND SPACE CENTER: The overall thrust of 1992's International Space Year and NASA Langley's role in the year-long celebration is highlighted in a Langley-developed exhibit on display in the Virginia Air and Space Center's second-floor changing gallery. The display focuses on two of NASA's major initiatives, Mission *to* Planet Earth--an investigation of our home planet--and Mission *from* Planet Earth--a return to the Moon and on to Mars.
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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia **23665-5225**

1917 - 1992
75 Years
NACA
NASA
Langley Research Center

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For Release:

Immediate

RELEASE NO. 92-144

Dear Editor/Reporter:

Traditionally thought of as an aeronautics research facility, NASA's Langley Research Center has made significant contributions to the nation's space program. Although a rocket has never been launched from nor has the Shuttle ever landed at this Hampton, Virginia, facility, NASA Langley rightfully claims the title "birthplace of space flight."

Langley researchers nurtured and fought for ideas, concepts and technologies that ultimtely proved essential to the success of major space projects like Mercury, Gemini, Apollo, Skylab and the Space Shuttle. They spearheaded major robotic exploration projects like Echo, Lunar Orbiter and Viking. And, they developed a reliable, low-cost, solid booster rocket, the Scout, that has put hundreds of scientific research payloads into orbit.

Without the fundamental information about space flight that only a basic research organization like NASA Langley can provide, no space program--past, present or future--could hope to succeed.

This feature release highlights Langley's contributions to space flight. It is provided for your consideration during 1992's International Space Year. Color and black-and-white photos to illustrate this information are available and are listed on the last page of the release.

ISY

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ISY

International Space Year Feature Release

NASA LANGLEY'S CONTRIBUTIONS TO SPACE FLIGHT

For more than 75 years, scientists and engineers at NASA's Langley Research Center in Hampton, Virginia, have been turning the dream of space flight into reality.

At Langley, researchers have adapted wind tunnels and other sophisticated equipment, much of it designed originally for aeronautical research, into tools for the study and promotion of space flight. They have built complex simulators and other subtly responsive interactive devices to explore the feasibility of traveling and occupying the foreign environment of space.

Langley researchers have nurtured and fought for ideas, concepts, and technologies that ultimately proved essential to the success of such major manned space projects as Mercury, Gemini, Apollo, Skylab, and the Space Shuttle. They have spearheaded such major unmanned exploration projects as Echo, Lunar Orbiter, and Viking.

They have developed a reliable, low-cost, solid-propellant booster rocket, the Scout, that has put hundreds of scientific research payloads into orbit.

And on several noteworthy occasions, the concerted efforts of Langley researchers have worked to overcome a specific problem plaguing the development of a particular piece of spaceflight hardware. A noteworthy example of this tradition of "fire fighting" in support of the space program is the work carried out at the Center in the 1970s and 1980s to perfect the Shuttle's thermal protection system, the tiles that protect the spacecraft from the intense heat of reentry into the atmosphere.

Without the help of the fundamental information about space flight that only a basic research organization like NASA Langley can provide, no space program--past, present, or future--could hope to succeed.

-more-

A HERITAGE IN AERONAUTICAL RESEARCH

Some might find it curious that a research center whose heritage is so deeply rooted in the study of airplanes could make as many basic contributions to the achievements of space flight as has NASA Langley. After all, no rocket has ever been launched from the place; not a single Space Shuttle has landed there. Everyone knows that Cape Canaveral, Florida, has the launching pads; Houston, Texas, Mission Control; Huntsville, Alabama, the rocket firing test facilities; and Edwards Air Force Base, California, the dry lakes for landings of high-speed vehicles. But what does Langley, in Tidewater Virginia, have to do with space flight?

The uninitiated visitor to Langley, pausing to ask that question, may be surprised to hear the answer: quite a lot. Langley is, in fact, one of the only three or four places in the country that can make a legitimate claim to being the birthplace of the American space program.

That is a remarkable claim for an organization whose roots go back to the fragile wooden biplanes of World War I and whose specified mission for the next 40 years had nothing directly to do with realizing the dream of space flight.

Long before the idea of space flight captured the American public's imagination and led, in the wake of the Russian Sputnik, to the creation of the National Aeronautics and Space Administration (NASA) in 1958, Langley researchers were seriously contemplating ways by which to turn the idea of atmospheric flight into reality.

As members of the Langley Aeronautical Laboratory, the oldest and largest facility of the National Advisory Committee for Aeronautics (NACA), they played a vital role from 1917 to 1958 incubating the ideas and hatching the technology that allowed American aviation to take off and fly.

In wind tunnels and in actual flight research, they tested nearly every American production aircraft built, and found ways, little and big, to improve upon most of them. During World War II alone, NACA Langley tested 137 different airplane types, representing more than half of all the types contracted for by the Army and Navy during the war and including virtually all types that actually saw combat service.

During the war Langley researchers also played a part in the development of the jet engine, and they observed with much greater interest and deeper insight than most people the practical appearance of such revolutionary new technologies as atomic energy and rocket propulsion.

From their station at the cutting edge of aviation technology, it did not take Langley scientists and engineers long to realize that their growing knowledge of high-speed aerodynamic problems translated nicely into solutions to problems posed by the flights of rockets and guided missiles. In the years immediately after the war, they moved quickly to investigate such bold new possibilities as flying a new breed of vehicle to the edge of the atmosphere and beyond.

TRANSITION TO SPACE

Even before World War II ended, NACA Langley established a rocket testing range at nearby Wallops Island, Virginia. From its remote beaches on the Atlantic, a small team of researchers launched small rocket-powered models weighing about 40 pounds. These pilotless, finely-instrumented models shot up into the air to a velocity of just one under half times the speed of sound (Mach 1.4), continued upward, and then dived into the ocean. Using radio telemetry and eventually Dopplar radar, NACA technicians on the ground tracked the models and gathered basic data about their overall aerodynamic performance.

The rocket-model testing technique was designed originally to produce meaningful information about transonic and supersonic flight--data that for technical reasons could not yet be produced in any wind tunnel. The NACA's idea was then to apply that precious data to the design of the high-speed jet and rocket powered aircraft that were then on the drawing boards. These aircraft included the experimental Douglas D-558 and Bell X-1, the first aircraft to assault the mythical "sound barrier."

The rocket-model testing done at that marshy barrier island provided information invaluable to the successful design of the first aircraft to fly supersonically. Ultimately, however, it came to signify much more.

The experience of systematically instrumenting, launching and tracking rockets from an installation of their own making prepared the Langley personnel for many of the early tasks in the American space program. The people and facilities that grew up around what in those days was known as Langley's Pilotless Aircraft Research Division, or PARD, were to make several basic contributions to the Mercury, Gemini, and Apollo manned space flight programs.

As a matter of fact, the Space Task Group that conceived and managed Project Mercury, America's first man-in-space program, came in large part from Langley staff whose formative experiences had been in rocket-model testing and upper atmosphere studies at Wallops.

At the same time that PARD was shooting rockets into the ionosphere, a small cadre of innovative thinkers back at the mother laboratory in Hampton began to design experimental vehicles that could, at least on paper, fly fast enough (or be boosted atop a rocket high enough) to jump out into space.

Four major types of manned vehicles capable of spaceflight were studied at Langley and the other NACA laboratories: the rocket-powered airplane, the hypersonic glider, the lifting body, and the ballistic capsule.

A rocket-powered “space plane,” the North American X-15, was actually built, much of it according to hypersonic concepts and wind tunnel data provided by engineers at NACA Langley.

In June 1959, 9 months after the dissolution of NACA and the establishment of NASA, the original X-15 made its first flight. One of the first NASA pilots to fly the plane was Neil A.

Armstrong, who, within the decade, would be the first man to walk on the moon.

Until the first orbital flight of the Space Shuttle Columbia in 1981, the X-15 held the speed and altitude records for winged aircraft, with flights as fast as 6.7 times the speed of sound and as high as 67 miles. This was far above what authorities recognized as the fringe of space.

The X-15 program ended in 1968. In many aspects, its design and audacious performance led the way to the Space Shuttle.

Furthermore, if not for the fact that the United States lacked a powerful enough booster in the 1950s, the country's first manned spacecraft might have been one of the hypersonic gliders conceived at Langley. Or it might have been a landable winged vehicle akin to a small Space Shuttle. As it turned out, however, it was to be a ballistic capsule that parachuted into the sea.

During the first 40 years of Langley's operation, the idea of working seriously to promote the immediate achievement of space flight was considered foolish. As the agency of the federal government responsible for the progress of the country's aviation technology, the NACA had enough to do without getting involved in what was then considered to be "Buck Rogers stuff."

In other words, space was a dirty word in the American political arena. One Langley veteran recalls that the NACA stood as much chance of "injecting itself into space activities in any real way as an icicle had in a rocket combustion chamber."

SPUTNIK AND THE BIRTH OF THE AMERICAN SPACE PROGRAM

One event changed all this: the Sputnik crisis. Nothing triggered the explosive growth of interest in space flight in the United States more than the Soviet Union's unexpected launching in October 1957 of the world's first man-made satellite.

Fortunately for the country, the NACA's mission had been broad enough to allow its researchers the freedom to probe the fundamental questions challenging the natural extension of atmospheric flight. For them, the Space Age had already started. From tests conducted in hypersonic wind tunnels, expansion tubes, electric arc-jets, and other types of advanced high-speed and high-temperature facilities, Langley researchers had already discovered much practical information about space flight and the problem of reentry.

As the Sputnik crisis intensified, however, the solid record of the NACA in aeronautical research and its pioneering efforts on behalf of a slow-but-sure transition to a spaceflight capability could not cancel out the worries and frustrations of the American people. The Russians had gotten a jump on us; we had somehow fallen behind; a space race had started; and our government needed to do something dramatic right now to close the gap.

In July 1958, following months of high-level meeting on the supposedly troubled state of the U.S. missile and space programs, President Dwight D. Eisenhower signed into law the

National Aeronautics and Space Act. This law abolished the old NACA, turning over its staffs and laboratories, including all those at Langley, as well as some important non-NACA facilities, to a new agency, NASA.

The first "A" in NASA stood for "Aeronautics," which meant that NASA Langley would continue its outstanding tradition of aeronautical research. As a vital part of what came to be known as the "Space Agency," however, Langley was going to find its money re allocated, many of its efforts redirected, and much about its thinking in need of reorientation. Everyone at the laboratory was running in the "Space Race." The first major leg in that race was to get a man into orbit.

PROJECT MERCURY

In its first week of existence, NASA organized a special task force known as the Space Task Group (STG); put veteran Langley engineer Robert R. Gilruth, head of PARD, in charge of it; and based it at Langley. The job of STG was to design and implement as quickly as possible a manned satellite project.

The project's name was Mercury. In less than three years' time, it was to put the first American into space.

The STG plan was to send a small one-man spacecraft into orbit using an existing intercontinental ballistic missile, the Atlas, as the launch vehicle and a ballistic reentry shape as the crew capsule. After a few passes around the Earth, a retrorocket would be fired to slow the satellite down and thus initiate descent from orbit. Following reentry into the atmosphere, which would be accomplished safely thanks primarily to the capsule's blunt heat shield, a large parachute would deploy, carrying the capsule and its human passenger on their final approach and landing into the open sea, where they would be recovered by helicopter and brought home aboard a naval vessel.

Not only was the Space Task Group located at Langley, over half of its 350 person staff, from Gilruth on down, came from the former NACA center.

Langley itself took on much of the direct responsibility for getting Mercury off the ground. It provided extensive research and technical support for the development of "Little Joe," a test launch vehicle driven by a cluster of four Sergeant solid rockets (like those fired at Wallops Island for many years) into a single airframe. Conceived by Langley engineers Max Faget and Paul Purser even before the birth of the STG of which they became a part, Little Joe quickly proved to be a reliable means of testing the Mercury capsule configuration at Wallops Island before proceeding to the more expensive and difficult phases of testing at Cape Canaveral. Although the cluster of Sergeant rockets for Joe was too weak to propel the Mercury capsule into orbit (the Atlas would be required for that), testing of the little rocket did much to ensure the

dependability of the Mercury capsule's escape system and drogue parachutes.

Langley engineers also designed "Big Joe," a full-scale instrumented mockup of the proposed Mercury spacecraft. This prototype, launched from Cape Canaveral on the top of an Atlas in September 1959, verified the feasibility of the Mercury capsule design.

In February 1959, NASA headquarters gave complete responsibility for planning and contracting for Mercury's worldwide tracking network, which included 18 stations around the world, to Langley.

In April 1959, the Mercury astronauts--the "Original Seven" as they came to be called --began their nationally publicized training under STG direction at Langley. While familiarizing them with the entire Mercury setup, personnel at Langley also helped the astronauts to specialize in the technical areas crucial to the overall success of the program. At the same time, they guided and monitored the astronauts' activities through the many procedure trainers and spaceflight simulators that had been built at the Center expressly for the manned space program.

Although the astronauts in training sometimes felt like guinea pigs, this was not often the case in their dealings with the Space Task Group at Langley. As the astronauts have attested, STG treated them as "active and valuable participants in the safe operation of the machine." Without a doubt, a major reason behind this respectful relationship was the years of experience that Gilruth and his staff had in dealing directly with test pilots in NACA aircraft research programs.

Here again, basic knowledge acquired over the years in NACA aeronautical research paved the way for a rational approach to the achievement of space flight. And at the same time that they were making essential contributions to the space program, researchers at NASA Langley still managed to maintain their position of overall leadership in aeronautical research.

ECHO

At the same time NASA Langley was doing as much as it could to support project Mercury, some of its researchers were giving equally serious attention to unmanned satellites for scientific studies of the Earth's upper atmosphere and for the development of global communications.

Several teams of Langley researchers developed unmanned satellite concepts. One concept that came quickly to fruition was Echo. Developed under the direction of Langley scientist William J. O'Sullivan, Echo was a 100-foot diameter balloon constructed of a very thin aluminum-coated Mylar plastic. In space it inflated automatically to a spherical shape on to which radar signals could be bounced. Folded compactly inside a metal container, Echo 1 was launched into orbit from Cape Canaveral atop a Thor-Delta rocket in August 1960.

Echo stayed in orbit for eight years, traveling more than 35,600 times around the Earth and making millions of people around the world look up into the sky in wonder at the artificial star that moved. During its billion-mile journey, the big balloon served various purposes: a test target for the development of advanced radars; a test vehicle for the development of a satellite method of performing worldwide geodetic surveys; a focal point for long-duration tests of space construction materials; and a means of providing atmospheric measurements on the border of space.

So among Langley's many contributions to space flight should be counted the world's first passive reflector communications satellite.

DESTINATION MOON

Project Mercury grew into Project Apollo--by way of Project Gemini. This happened initially without much fanfare, because the first announced goal of Apollo was simply to sustain an orbit around the Earth, or perhaps the moon, with a multi-man crew. As always, Langley Research Center was ready to do what it could to help.

On May 25, 1961, however, the plan for Apollo changed in an incredibly big way: in a speech to Congress, President John F. Kennedy committed the nation to a manned lunar landing "before the decade is out." Apollo was the vehicle.

Answering President Kennedy's challenge and landing men on the moon by 1969 required the most sudden burst of technological creativity and the largest commitment of resources ($24 billion) ever made by the nation in peacetime. At its peak the Apollo program employed an estimated 400,000 Americans and required the support of some 20,000 industrial firms and universities. As JFK had said, "it will not be one man going to the moon--it will be an entire nation. For all of us must work to put him there."

NASA Langley participated more than most in the achievement of the lunar objective. It helped to establish and improve the basic concepts and fundamentals of both the Apollo program and its necessary antecedent, Project Gemini. (After thinking through the lunar mission for several months, NASA established Gemini in order to establish the feasibility of rendezvous and docking in space before having to face them in faraway lunar orbit.) In the Center's wind tunnels, researchers studied the aerodynamic integrity of the Saturn-Apollo launch combination. Under the title of Project Fire, they investigated reentry heating and its potentially fatal effects on a returning spacecraft. They also played a major role in the training programs that prepared the astronauts for rendezvous and docking and for the actual landing of a manned spacecraft and astronaut locomotion activities on the moon. In the mid-1960s they also managed the very important Lunar Orbiter Project that made systematic photographic maps of the lunar landing sites.

Langley's most fundamental contribution to Apollo, however, was its development of the lunar-orbit rendezvous (LOR) concept. On it, the success of Apollo absolutely depended.

The brainchild of a few true believers who had been experimenting with the idea since 1959, the basic premise of LOR was to fire an assembly of three spacecraft into Earth orbit on top of a single powerful rocket (which turned out to be Wernher von Braun's Saturn V). This assembly would include (1) a mother ship or command module, (2) a service module containing the fuel cells, attitude control system, and main engines, and (3) a small lunar lander. In Earth orbit, the last stage of the rocket would fire, boosting the combined Apollo spacecraft on to its flight trajectory to the moon. In lunar orbit, two crew members would don space suits and climb into the lunar lander and take it down to the surface. The third crew member would maintain a lonely vigil in lunar orbit inside the mother ship. After exploring, the top half of the lunar excursion module (LEM) would rocket back up and re-dock with the command module. The LEM would then be discarded to the vastness of space, and the three astronauts in their command ship would head for home.

The inherent complications and grave dangers of rendezvous in distant lunar orbit, where nothing could be done to save the astronauts if there was trouble, worried leaders of the Apollo program greatly. After months of debate, however, NASA endorsed the bold plan of the Langley engineers. The leadership did so because LOR, unlike the other two options (direct-ascent and Earth-orbit rendezvous), offered a real chance of achieving a manned lunar landing by 1969.

Even before its controversial mission concept had been selected by NASA headquarters as the mission mode for Apollo, Langley had made several successful simulated studies of a manned lunar landing using LOR. After LOR was formally chosen in July 1962, researchers at the Center constructed major training facilities, such as the Rendezvous and Docking Simulator and the Lunar Landing Research Facility, to make sure that the Apollo astronauts mastered the necessary piloting techniques and procedures long before they blasted off.

The LOR concept, and the training it required at Langley and elsewhere, worked out beautifully. On July 20, 1969, Apollo 11 astronauts Neil Armstrong and Buzz Aldrin in the lunar module "Eagle" gingerly made their way down to the Sea of Tranquility, becoming the first men on the moon. Circling above, in lunar orbit, was astronaut Michael Collins in the command module "Columbia."

Kennedy's lunar objective had been met -- just barely -- and it had been done according to the LOR plan that Langley engineers had proposed and championed through strong opposition. Six more flights followed to the moon in the next two and a half years, the last one--Apollo 17-taking place in December 1972. Each mission visited a different spot but took a path to and from the moon that was a carbon copy of Apollo 11. Each was done via LOR.

SKYLAB

From Apollo technology there was one major spinoff program to which NASA Langley made several significant contributions; this was Skylab.

A much overlooked achievement of the early 19705, Skylab was in essence our country's first operational space station. NASA built it inside the third stage of a Saturn rocket, outfitted as a laboratory on the ground, and then launched it into Earth orbit. Skylab was inhabited for weeks at a time in 1973 and 1974 by three different teams of separately—launched astronauts who had docked with it inside an Apollo spacecraft.

Inside Skylab, which was about the size of a three-bedroom house, the astronauts conducted fundamental research in astronomy, biology, and medicine, while NASA monitored and tested their performance in long-duration flights lasting as long as 84 days. Even though the program lasted for less than a year, a great deal was learned about what it would be like for humans to live and work In weightlessness for long stretches of time inside a space habitat. Such physiological and psychological information about space travelers will be vital if humankind ever attempts interplanetary voyages.

Several experiments conducted in Skylab were devised at Langley. Researchers at the Center also helped to work up the essential sunshade devices that not only kept the Skylab's interior cool but protected its inhabitants from harmful solar radiation and high-energy cosmic rays.

SPACE STATION

NASA Langley had worked on various space station concepts long before Skylab—-or even before Apollo. In fact, during the early 1960s, when many experts felt that an Earth-orbiting station would be necessary as a relay base for lunar missions, Langley's designs led the way in NASA for planning of a manned orbiting laboratory.

Although this lead was later taken over by Houston and Huntsville, Langley over the years has continued to probe the many technical challenges of designing, building, and operating an effective multi-purpose laboratory in space. Today this involvement includes substantial work in support of NASA's plans for Space Station Freedom. Langley staff members are deeply involved in researching the technologies, materials, and automated construction processes that make such large structures in space possible.

One step in this direction was the deployment and retrieval of Langley's Long Duration Exposure Facility (LDEF), which was conceived, designed and developed at Langley. The bus sized satellite carried 57 experiments into low-Earth orbit for six years. On board were more than 10,000 items to test the effects of long-term space exposure on spacecraft materials,

components and systems. The wealth of information colected during its journey will be invaluable for the design of future spacecraft.

SPACE SHUTTLE

With its tradition of research into the performance of winged flying vehicles and its pioneering work on hypersonic gliders, the X-15, and other types of "space planes," it should be no surprise that Langley made vital contributions to NASA's Space Shuttle program. Much of the basic aerodynamic testing of the Space Shuttle was done in Langley's wind tunnels.

The problems facing a hybrid reusable vehicle that flies into, through, and back from space, from blast off to a landing on a runway, are unusually extreme--to say the least. During any mission, the Shuttle must pass through three distinctly different flight regimes: hypersonic, supersonic, and subsonic. Over the years Langley engineers pioneered research in each one of these speed regimes, and knew that each regime by itself posed difficult problems. Together, these problems made the Shuttle program into one of the biggest challenges Langley's wind-tunnel complex ever faced. Just to complete the essential work, it took NASA Langley many thousands of hours of wind-tunnel testing over a period of several years.

Even today Langley engineers continue to explore the performance of the Shuttle. Among a number of program support activities, there has been a focus on further testing of the Shuttle's landing and crew emergency escape systems, reentry heating conditions and overall materials.

FUTURE SPACEFLIGHT VEHICLES

While continuing to support the Shuttle program, NASA Langley also has been exploring the feasibility of a number of new type space flight vehicles for future U.S. operations.

Hypersonic research has been a Langley forte for over 40 years, and it will continue to be of fundamental importance to its national mission for many years to come. In 1987, NASA selected Langley as the lead center in charge of studying the technologies needed by a hypersonic aerospace plane. The transatmospheric vehicle that has been conceived in theory would be capable of accelerating to speeds in excess of twenty times the speed of sound, jumping into space and traveling between any two points on the globe in two hours or less.

The development of the aerospace plane will depend, however, not only on a military mission or economical use for such a vehicle, but also on yet-to-be found solutions to a web of obstinate aerothermodynamic and propulsion problems. Specifically, it will hinge on the feasibility of a powerful new air-breathing propulsion system known as a scramjet." This unique engine, a supersonic combustion ramjet, would breathe air up to the outer reaches of the atmosphere and then use rockets to maneuver in space.

In the last few years, research at Langley has gone a long way toward proving the value not only of the scramjet but also of an integrated aerospace plane design. A recent upgrading of its 8-Foot High-Temperature Tunnel gives the Center one of the premier scramjet testing facilities in the world.

To complement the Space Shuttle system and provide assured manned access to space for the next generation of space programs, Langley had conceived the HL-20 lifting body "space taxi." This system was designed primarily to change Space Station Freedom crews.

Another current thrust for future space flight at Langley is research into the potential of "aeroassist" or "aerobraking" technology. The common means of slowing down a spacecraft during atmospheric reentry ever since the flights of the blunt-bodied Mercury capsule, aerobraking technology is important to the future of the space program because it is a way that could enable a spaceship to decelerate within a planetary atmosphere without using up its precious fuel supply.

NASA believes aerobraking technology has important applications for a future class of modular "transfer vehicles" that might take payloads or crews from a spaceport in low Earth orbit to the moon, Mars, or other destinations in the inner solar system.

VIKING TO MARS

A mission that has always excited dreamers is a manned landing on the intriguing planet, Mars. According to many space flight enthusiasts, including the members of the 1985 National Commission on Space, Mars is the next grand destination for human exploration.

NASA Langley has more than a passing acquaintance with the red planet. For several years it was the home of the Viking program that in 1976 sent four unmanned spacecraft to Mars: two orbiters that took photographs and served as a communications relay, and two landers that descended to the Martian surface and probed in various ways for evidence of rudimentary life forms and for conditions that might have once given birth to some.

As far as the Viking's biological instruments and other elaborate probes and sensors could tell, nothing presently lives on Mars. The evidence also suggested, however, that things might have been very different in the past.

The successful missions of four spacecraft to Mars--some 65,000,000 kilometers away must be rated as one of the greatest technological triumphs of our time. In some ways, the achievement surpasses even the Apollo landings on the moon.

Without a doubt, Viking is one of Langley's greatest achievements and one of its most outstanding contributions to space exploration.

MISSION TO PLANET EARTH

At present NASA Langley is also leading the way for much of the basic science that might be done as part of what former NASA astronaut Sally Ride has called "Mission to Planet Earth." The goal of this critical mission would be nothing less than the continued good health of our good Mother Earth.

The key to this mission is the use of satellites and other space technologies as a means of keeping a close eye on the ozone layer and other changes in our precious global biosphere. Over time these changes, though subtle, can have a very damaging or even catastrophic impact on life here on Earth.

SUMMARY

Through hard work, inspiration, and imagination, a basic knowledge of aeronautical problems has evolved over the years at NASA Langley Research Center into opportunities for flight and the exploration of space.

Langley may not have the launch pads, the mission control rooms, or the spacecraft landing sites, but it possesses the essential tools of aerospace research. Without those tools and the talented people who build, use, and learn from them, no venture into space could ever be attempted safely.

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The following still photos are available to support this news release. To obtain, please call the Office of Public Affairs, 864-8150.

L-89-361	7 Original Astronauts in Spacesuits
65-7597	Scout Launch Vehicle
P-18296	Viking Lander on Mars
HQ 62-MA6-48	John Glenn entering "Friendship 7" capsule
L-59-336	Mercury capsule model in Full-Scale Tunnel
	Wallops launch
L-59-4946	Little Joe capsules
L-59-5137	Little Joe launch
L-61-4597	Echo
L-64-1609	Gemini Rendezvous and Docking Simulator
L-67-7231	Lunar Orbiter
L-66-6399	First view of Earth from space
62-5848	Houbolt at chalkboard describing Lunar Orbit Rendezvous
L-70-2208	Alan Shepard w/LEMS
L-69-6714	Lunar Landing Research Facility
L-92-1253	LDEF retrieval
KSC-92PC-1461	Shuttle landing w/parachute (Columbia) 7/9/92
L-78-3478	Shuttle model in wind tunnel
92-06707	NASP mockup
90-12044	HL-20

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665-5225

1917 1992 75 Years NACA NASA Langley Research Center

For Release:

RELEASE NO. 92-150

LANGLEY STORY OPPORTUNITIES -- NOVEMBER 1992

LANGLEY INNOVATIONS TO BE FEATURED AT 'TECHNOLOGY 2002': Four Langley research topics will be presented at the third annual national technology transfer conference entitled "Technology 2002." The NASA-sponsored event, to take place Dec. 1-3 in Baltimore, will include exhibits and presentation of papers. Langley topics are in areas of "information and communications" and "computer software."
Interview opportunities available.
Public Affairs contact: Keith Henry (804) 864-6124

TIME CAPSULE TO BE BURIED IN DECEMBER: NASA Langley completes its year-long 75th Anniversary celebration by burying a time capsule designed to last 75 years. Plans are to open the capsule at the 25-year mark, in the year 2017 as part of the Center's 100th anniversary, then reseal it until the Center's 150th anniversary. The sturdy capsule will be set in concrete and filled with inert gas. The site will be marked with a bronze arch fabricated by Langley craftsmen. It will include items representative of Langley research activities, its people and extracurricular activities.
Public Affairs contact: Cathy Schauer (804) 864-6122

ANNIVERSARY FLASHBACK 50 YEARS AGO (NOV. 8): The NACA's Langley Memorial Aeronautical Laboratory announces that women will be hired "for vital war work" and will hold jobs formerly held only by men. Langley, long a leader in equal opportunity efforts, proceeded to hire women as matheticians, model makers and wind tunnel researchers, among others. An opportunity to highlight an interesting and significant milestone in Langley's 75-year history.
Still photographs available.
Public Affairs contact: Keith Henry (804) 864-6124

ANNIVERSARY FLASHBACK 50 YEARS AGO (NOV. 23): The VS-173, a full-scale model of an experimental fighter aircraft with an almost circular wing, makes its first flight at Vought-Sikorsky. A military version is later built but never flown. The colorful "Zimmer Skimmer" was designed by NACA researcher Charlie Zimmerman. (NACA is the predecessor agency that formed the core of NASA.) This summer Zimmerman was recognized by the Experimental Aircraft Association (EAA), and his work was recently featured in "Wings," the Discovery Channel's aviation documentary series.
Still photograph available.
Public Affairs contact: Keith Henry (804) 864-6124

- more -

FEATURE PHOTOGRAPHY:

WINDSHEAR COLLECTION: NASA Langley's windshear flight research expeditions are captured in this extensive set of feature photos by Langley photographers Peggy Pancoast and Carol Petrachenko.
Public Affairs contact: Mike Finneran (804) 864-6126
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

UPDATE ITEMS:

STORIED NASA RESEARCH PILOT HONORED NOV. 7: A NASA engineer and research pilot who test flew more than 200 different types of aircraft over a 40-year career will be honored by the Michigan Aviation Hall of Fame Nov. 7. Among his contributions, aviation pioneer John P. "Jack" Reeder helped develop the P-51 fighter, a highly successful U.S. fighter aircraft of World War II, the British Harrier fighter and modern advanced transport operating systems that have enhanced airport and runway capacity. Jack is available to reflect upon his career and the aircraft he has flown, including a few harrowing experiences as research pilot. Photos and interview opportunity available.
Public Affairs contact: Keith Henry (804) 864-6124

ANTARCTIC OZONE DEPLETION: The so-called ozone hole has been measured by NASA scientists using a satellite-borne sensor. Langley researcher Dr. Pat McCormick, who has studied ozone depletion for the past 14 years, is available to discuss preliminary findings. Loss of protective ozone from the Earth's stratosphere over the Antarctic region may be greater than in recent years.
Interview opportunities available.
Public Affairs contact: Craig Murden (804) 864-3296

POLLUTION DATA BEING EXAMINED FROM TWO EXPEDITIONS: Measurement data are being analyzed from expeditions to South Africa and Brazil to examine the connection between burning of plant life and the production of harmful, low-level ozone. Senior NASA scientists Dr. Joel Levine and Wesley R. Cofer III, working alongside other scientists from around the world, conducted ground and aircraft measurement of smoke generated by the burning of southern African grasslands. Other Langley atmospheric scientists, including James M. Hoell, Jr. and Dr. Jack Fishman, made complementary measurements in Brazil using satellite, airborne and ground-based platforms. These polluting emissions, discovered far from normal industrial and automotive sources, are being examined for insights about the global impact of biomass burning. Photos and interview opportunities available.
Public Affairs contact: Craig Murden (804) 864-3296

WINDSHEAR FLIGHT RESULTS: Scientists continue to analyze results from a series of windshear flight tests conducted this summer. More than 50 windshear microbursts were penetrated by a NASA 737 aircraft outfitted with three different types of advance warning sensors. The FAA has directed airlines that choose advance-warning sensors to install them by December 1995. Microbursts are a weather condition that has been blamed for more than 500 airline deaths.
Available are a video, photos, fact sheets and interview opportunities.
Public Affairs contact: Mike Finneran (804) 864-6126

NASA News

National Aeronautics and
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For Release:
February 1, 1993

RELEASE NO. 93-005

LANGLEY RECEIVES PROCUREMENT AWARD FOR CONTRACT WORK

NASA's Langley Research Center has received the NASA Procurement Award for Outstanding Competition Advocacy for 1992.

The Center was recognized for its achievements in obtaining competition for more of its contracts than any other NASA center, both in dollars and separate contracts.

In 1992, more than 92 percent of Langley's contracts were awarded competitively as a result of less restrictive requirements, innovative and effective methods of publicizing future contracts, and increasing the level of communications, so interested companies can more easily obtain information to prepare proposals.

Langley has been working toward improved competition for some time. "In 1991, Langley's competitive actions and dollars exceeded 90 percent," according to William Kivett, who heads the Center's Acquisition Division. "Our continuous efforts to enhance competition, mitigate incumbent advantage, and increase our source database have been very successful."

Government agencies have been closely monitored since passage of the 1984 Competition in Contracting Act to ensure that contracts are competed whenever possible.

- end -

NASA News

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For Release:

March 18, 1993

RELEASE NO. 93-007

NEW TECHNOLOGY TRANSFER PROCESS TEAMS NASA AND INDUSTRY

The NASA Industry Fellowship Program encourages American industry to send researchers to Langley to develop new, non-aerospace applications of Langley-developed technologies.

Under the fellowship program, Supra Medical Systems (formerly TOPOX, Inc.), of Chadds Ford, Pa., has two employees working at Langley to develop a method for early detection of breast tumors, a method that will use Langley-developed and patented high frequency ultrasonic technology instead of radiation.

A cooperative agreement with Supra Medical Systems provides laboratory space, equipment and technical consulting services from NASA for the Supra Medical Systems' employees working at Langley in the Nondestructive Evaluation Laboratory.

Traditionally, patent licensees develop technology applications in their corporate laboratories, without direct interaction with NASA scientists and engineers. This new program should speed the transfer of Langley's technology to the commercial sector.

According to Joe Mathis, who heads Langley's Technology Utilization Office, "NASA welcomes collaborative/cooperative partnerships between American industry and NASA researchers to help provide an additional return on the American taxpayer's investment in NASA."

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NASA News

National Aeronautics and
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Hampton, Virginia 23681-0001

RELEASE NO. 93-04

For Release:

LANGLEY STORY OPPORTUNITIES -- FEBRUARY 1993

PROJECT LEAD COFFINS -- WEDNESDAY, FEB. 3. Project Lead Coffins is the topic of the Wednesday, February 3, NASA Langley Research Center Colloquium Series. This presentation will focus on the recent scientific investigations into the three intact lead coffins found in 1990 under the ruins of a 17th Century church in St. Mary's City, Maryland. The project has provided new insights into life in early America. The coffins became part of NASA's search for "preindustrial" air as part of an effort to understand the relationship between human activity and climate change. Although "old" air was not found by the NASA Langley team, the search goes on.
Photos available.
Public Affairs Contact: Catharine Schauer 804-864-6122

ENVIRONMENTAL PROTECTION: NASA Langley, a leader in environmental protection, has been approached by the EPA to take part in a new experimental program designed to speed the clean up of hazardous materials sites. The Superfund Accelerated Cleanup Model (SACM) is designed to direct funds into actual clean up efforts, rather than studies of the sites. NASA Langley has invited community residents to become informed partners in the clean up of six contaminated sites. Public meetings are scheduled to begin later this year.
Interviews, photos, fact sheets, graphics available.
Public Affairs contact: Catharine Schauer, 804 864-6122.

ADVANCED SST -- HIGH SPEED RESEARCH. Langley is working to keep the U.S. aerospace industry a world leader by developing new technology for an advanced supersonic transport. The first nation to produce an environmentally friendly and economical SST will capture a lucrative multi-billion dollar world market. In addition to wind tunnel work and ground simulations, NASA Langley will also perform flight tests. An F-16XL, one of only two such advanced aircraft, will arrive at Langley in February for a series of "high lift" tests. A supersonic aircraft with a high lift wing could take off and climb more quickly thereby reducing airport community noise, an important environmental concern.
Interviews, still photos, 5-minute video available.
Public Affairs contact: Keith Henry, 804-864-6120

- more -

TECHNOLOGY TRANSFER -- AIRLINE SAFETY EQUIPMENT. Langley windshear information is being rapidly adopted by the U.S. avionics industry. Manufacturers are now bringing windshear warning devices to market. Three U.S. companies will be producing radar-based advanced warning systems similar to the one the NASA Langley Boeing 737 tested. A laser-based advanced warning system, also tested on the NASA 737, is also being developed. Such systems should give commercial airline pilots precious extra seconds to avoid potentially dangerous microbursts, strong downdrafts of air that can force an airplane to the ground during takeoffs and landings.
Interviews, photos, video available.
Public Affairs contact: Keith Henry, 804-864-6120

LANGLEY TETHERED SATELLITE SET FOR MARCH LAUNCH. Using a concept similar to that of a fisherman's spinning reel, NASA engineers will soon unreel a small payload into space with a tether, a super-strong cord resembling twisted strands of dental floss. The Small Expendable Deployer System (SEDS) is designed to be a versatile, economical system for delivering smaller payloads to orbit. The payload was designed, developed and fabricated by Langley Research Center. Launch is scheduled on an unmanned Delta II rocket in mid-March from Cape Canaveral Air Force Station.
Interviews available, photos available.
Public Affairs contact: Cathy Schauer, 804-864-6122

NEW TECHNOLOGY TRANSFER PROCESS TEAMS NASA LANGLEY & INDUSTRY. A company is taking advantage of a new program that encourages American industry to send researchers to Langley to develop new, non-aerospace applications of Langley-developed technologies. Under the NASA Industry Fellowship Program, TOPOX, Inc. of Chadds Ford, Pa., has two employees working at Langley to develop a method for early detection of breast tumors, a method that will use Langley-developed and patented ultrasound technology instead of radiation. This process promises to be a more effective technology transfer method. Traditionally, patent licencees develop technology applications in their corporate laboratories, without direct interaction with NASA scientists and engineers. This new process should speed the transfer of Langley's technology to the commercial sector.
Photos available.
Public Affairs contact: Cathy Schauer, 804-864-6122

COMING SOON:

NASA LANGLEY SPINOFFS. A special story opportunities release will showcase NASA Langley's contribtions featured in the agency's annual *Spinoffs* magazine. Every year, dozens of marketable concepts are derived from NASA aerospace research that have potential business, recreation, biomedical or other applications.

- End -

NASA News

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For Release:
IMMEDIATE

RELEASE NO. 93-09

LANGLEY STORY OPPORTUNITIES -- MARCH 1993

THE ROLE OF 'SURPRISE' IN SCIENCE TOPIC OF MARCH 8 TALK. "Serendipity: Luck in Scientific Discovery" is the topic for the 2 p.m. March 8 Colloquium at Langley Research Center and later that same evening at 7:30 p.m. at the Virginia Air and Space Center. Dr. John F. Christman, professor emeritus, Loyola University, New Orleans, La., will discuss the role the unplanned or unexpected plays in scientific discovery. Press briefing at 1:15 p.m. at H.J.E. Reid Conference Center, Langley.
PUBLIC AFFAIRS CONTACT: Cathy Schauer 804-864-6122

INDOOR SONIC BOOM TESTS SUPPORT HIGH SPEED CIVIL TRANSPORT RESEARCH. Thirty volunteers are taking their turn sitting in a 5-foot square "boom box" for tests that compare sonic booms with conventional aircraft noise. Langley has been named lead NASA center for management of the agency's technology development program for a future High Speed Civil Transport -- a new supersonic airliner. Such an aircraft would fly 250-300 people across the Pacific at supersonic speeds, cutting hours from the time of the same flight with today's 747. Photos and interview available.
PUBLIC AFFAIRS CONTACT: Keith Henry 804-864-6120

EMBARGOED UNTIL 6 PM MARCH 4 (MT. PINATUBO ITEM ONLY):
STUDY SHOWS MT. PINATUBO ERUPTION COOLED THE EARTH. NASA Langley Research Center findings announced today (March 5) reveal that the massive volcanic eruption of the Philippines' Mt. Pinatubo in July of 1991 cooled the Earth. Langley Atmospheric Sciences Division researchers, using information from NASA's ERBE satellite, have made the most meaningful measurements to date of global cooling caused by a volcanic eruption. The findings are featured in the current cover story of *Science* magazine distributed March 5, 1993. Photos and interview available after 6 p.m. March 4 embargo.
PUBLIC AFFAIRS CONTACT: Cathy Schauer 804-864-6122

- more -

COMPOSITE TECHNOLOGY GOES GREEN. Langley and the EPA are looking at ways to use the center's expertise with composite materials to make industry significantly cleaner in the future. Towpreg, a composite material that uses a dry powder fabrication technique, might eliminate some industrial chemicals and their disposal costs. This matches the current strategic thrust in environmental protection: Dealing with pollution by not creating waste in the first place. Photos and interview available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer 804-864-6122

LAMINAR FLOW TEAM WINS NATIONAL SPACE CLUB AWARD. The Boeing-NASA-Air Force Hybrid Laminar Flow Team has been selected to receive the National Space Club's 1993 Nelson P. Jackson Award. The award recognizes "that U.S. firm which has made the most outstanding contribution to missiles, aircraft or space endeavors over the past year." The team will receive the award for new technology which produced extensive drag-reducing laminar flow on the wing of a modified Boeing 757 commercial transport. This technology can result in improved fuel efficiency for the next generation of subsonic airliners. The award will be presented in Washington, D.C. at the club's "Goddard Memorial Dinner" March 26. Photos and interview available.
NATIONAL SPACE CLUB CONTACT: Ms. Rory Heydon 202-639-4210
PUBLIC AFFAIRS CONTACT: Keith Henry 804-864-6120

SPACE TAXI ART. Five paintings of Langley's HL-20 lifting body spacecraft concept are among the latest additions to the NASA Art Program. Nationally recognized aerospace artist Stan Stokes created the acrylic renderings which profile a typical mission from launch to runway landing. The paintings will go on public exhibition March 23 at Hampton's Virginia Air & Space Center. Artist interviews and photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer 804-864-6122

PUTTING THE RIGHT SPIN ON IT. Langley is completing a significant upgrade to increase productivity in its 20-Foot Vertical Spin Tunnel. Small models are tossed frisbee-style to study ways to combat the out-of-control maneuver known as a "spin." Interviews and photos available.
PUBLIC AFFAIRS CONTACT: Keith Henry 804-864-6120

NASA/PBS EDUCATION SPECIAL. The latest example of NASA's educational outreach is a prime-time special entitled "Living and Working in Space: The Countdown has Begun," set to air on PBS March 31 at 8 p.m. EST (WHRO-TV/Ch.15 locally). NASA Langley supports education outreach through its Teacher Resource Center located at the Virginia Air & Space Center. Video and interviews available.
LANGLEY TEACHER RESOURCE CENTER CONTACT: Ray Goodman 804-727-0900 x757
PUBLIC AFFAIRS CONTACT: Keith Henry 804-864-6120

- End -

NASA News

National Aeronautics and
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Headquarters, Washington, D.C.
(Phone: 202/358-1547)

For Release:

March 4, 1993
Embargoed Until 6 P.M.

RELEASE: 93-011

MT. PINATUBO ERUPTION CAUSES TEMPORARY COOLING OF EARTH

Satellite observations confirm that Mount Pinatubo's eruption in June 1991 resulted in a temporary cooling of the Earth that equates to a decrease in global surface temperature of approximately 1 degree Fahrenheit (0.5 degree Celsius).

"A 1 degree Fahrenheit decrease in global temperature is significant," said Dr. Patrick Minnis of NASA's Langley Research Center, Hampton, Va. "The increase in solar radiation reflected from the Earth, responsible for this cooling, continued through October 1991 and is well correlated with the gradual spread of the Pinatubo dust cloud over the globe.

"Data show that the relative cooling produced by Mount Pinatubo is 60 percent greater than any other climate disturbance since 1976. Systematic global observation of the Earth's radiation balance began that year," said Dr. Minnis.

"Surface cooling may follow the radiative response by several months to a year, and the effect of Mount Pinatubo may be evident for some time after most of the dust cloud has settled back to the surface. Indications are that the effects of Mount Pinatubo may be felt through early 1994," he said.

Volcanic activity has been suspected of causing significant short-term climate changes. Powerful volcanic eruptions typically send huge quantities of gases and ash into the stratosphere. The gases and ash produce aerosols that block incoming sunlight, which can have an effect for many years.

Analysis of measurements from NASA's Earth Radiation Budget Experiment (ERBE) satellite has provided the first conclusive evidence of a significant change in global energy due to a volcanic eruption.

ERBE satellite measurements provide the data needed to understand the link between volcanic dust and temperature changes at the Earth's surface. The gases and ash ejected by volcanos can penetrate into the stratosphere from 7 to 30 miles high (11.2 to 48 kilometers), where the debris may form a dust veil that spreads over the globe and slowly filters down to the surface over several years.

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The dust veil reflects some of the sun's rays back to space, thus cooling the Earth's surface. But volcanic dust also can produce a greenhouse warming effect by trapping the infrared rays emitted by the Earth. The net effect ultimately determines changes in the surface temperature.

Whether the dust cloud cools or warms the Earth and by how much depends on the concentration, sizes and shapes of the particles in the dust cloud. Because the latter two quantities are difficult to estimate, climate computer-model predictions are subject to potentially large uncertainty.

Heating and cooling of the Earth is determined by the balance between absorbed solar radiation and emitted infrared radiation. Solar radiation that is not reflected by clouds, the atmosphere or the surface, is absorbed and causes the Earth to warm. The emitted infrared radiation cools the Earth by carrying heat away from the planet.

ERBE directly observes changes in the emitted infrared and reflected solar radiation and enables scientists to match the radiation predictions with ERBE data.

Launched in 1984, ERBE is one of the precursor missions in NASA's long-term Mission to Planet Earth program for studying climate change. The ERBE instruments were developed at NASA's Langley Research Center, Hampton, Va., and the TRW Corp., Redondo Beach, Calif. Langley is responsible for data analysis.

The results of a study by NASA researchers on "Radiative Climate Forcing by the Mount Pinatubo Eruption" will be published in the March 5 issue of Science.

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EDITORS NOTE: A computer-generated graphic depicts ERBE satellite results showing how the aerosols affect incoming solar energy. The graphic can be obtained by calling 804/864-6122. Ask for L-93-1953.

NASA News

National Aeronautics and
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Langley Research Center
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For Release:

March 25, 1993

Drucella Andersen
Headquarters, Washington, D.C.
(Phone: 202/453-2721)

H. Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6120)

RELEASE: 93-10

NASA TO DEVELOP TECHNOLOGY FOR FUTURE HIGH-SPEED RESEARCH

NASA's Langley Research Center, Hampton, Va., will lead a multi-year, research program effort to develop technology for a future high-speed civil transport.

The joint NASA-industry effort would provide a technical foundation that the nation's aerospace companies could use to make intelligent business decisions about future supersonic transport airframe and engine development programs.

"The program is laying a technical foundation for an environmentally compatible, economically practical commercial transport that could contribute up to 140,000 jobs and $200 billion to the national economy in the next century," said Louis J. Williams, Director of the High-Speed Research Division at NASA Headquarters, Washington, D.C.

Langley will manage high-speed technology in aerodynamic performance, airframe materials and structures, flight deck systems and airframe and systems integration. In addition, Langley researchers are working to reduce sonic boom, reduce overall structural weight and improve aerodynamic performance.

NASA's Lewis Research Center, Cleveland, is working on technology that will reduce engine noise and dramatically lower nitrogen oxide emissions that might affect Earth's ozone layer.

- more -

NASA's Ames Research Center, Mountain View, Calif., is flying high-altitude missions to help analyze the impact of a future high-speed civil transport's engine exhaust on the atmosphere.

NASA's Dryden Flight Research Facility, Edwards, Calif., is flight-testing a drag-reduction concept called "laminar flow control" that could significantly improve the efficiency of a supersonic transport's wings.

The High-Speed Research Program will complete Phase I, which focuses on environmental challenges, in 1996. Phase II, which began in 1993, focuses on technology to provide economic viability for a high-speed civil transport.

The program's technical management is being consolidated at Langley because the center has research skills and facilities in most of the disciplines important to the success of a future high-speed airliner. W. Ray Hook has been named to head the project office.

"Hook's previous program management experience, coupled with his involvement in the Atmospheric Science Division's analysis of the potential environmental impact of a high-speed transport and his unique experience as the leader of the NASA Aeronautics Red Team, make him especially well qualified for this important leadership position," said H. Lee Beach, acting Langley director.

- End -

NASA News

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For Release:

RELEASE NO. 93-16 IMMEDIATE

LANGLEY STORY OPPORTUNITIES -- APRIL 1993

LANGLEY MATERIALS EXPERIMENT ON APRIL SHUTTLE FLIGHT. STS-57, scheduled for launch in April, will carry Langley's Gas Permeable Polymeric Materials flight experiment. The materials are being developed for many uses, including special contact lenses for long term wear and for use by pilots and astronauts, medical applications such as dialysis and blood gas monitoring, and commercial production of pure gases. Photos, materials available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

SPACE SHUTTLE AS 'X-PLANE'. The April 27-30 Orbiter Experiments (OEX) Aerothermodynamics Symposium, to be held in Williamsburg, Va., will examine a variety of Space Shuttle Orbiter experiment flight data and resulting technology advances. The Shuttle, although not designated an X-Plane, provides real flight experience to validate ground-based testing and computer simulation techniques which will be used for the design of the next generation of space transportation vehicles. Interviews by appointment only. Graphics available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

'CAN DO' PROJECT GOES INTO ORBIT: The Langley-sponsored Get-Away Special student experiment payload "CAN DO" will reach orbit onboard the Space Shuttle Endeavour in April. Students from seven states (including a team from Poquoson, Va.) are managing photographic and materials experiments in a real world learning experience. Daily educational television programming will be broadcast from student mission control by the South Carolina Education Television (SC ETV). A 16-minute CAN DO overview video is available from SC ETV. Interviews are available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

NASA COOL SUIT MAKES 'HALL OF FAME'. A technology developed for NASA's space program will be inducted into the Space Technology Hall of Fame April 15. The technology was originally developed for a liquid-cooled garment to be worn inside astronaut space suits. Today, it is used for a variety of purposes, including Langley-promoted biomedical applications. Interviews available.
U.S. SPACE FOUNDATION CONTACT: Barry Grossman, 719-576-8000
PUBLIC AFFAIRS CONTACT: Cathy Schauer

NASA LANGLEY 'SPINOFFS' AVAILABLE. A special story opportunities release (#93-14) showcasing NASA Langley's contributions to the agency's annual *Spinoffs* magazine is available upon request. Every year, dozens of marketable concepts that have potential business,

- more -

recreation, biomedical or other applications are derived from NASA aerospace research. The following is one example:

Sailboard Fin Design. A Florida windsurfing enthusiast turned to NASA airfoil technology to solve the problem of "spinout" in the popular sport of boardsailing. (Spinout occurs when the underwater fin near the stern cannot generate enough horizontal lift to counterbalance the vertical lift of new high-performance sails.) Drawing upon NASA technical papers and a computer program developed at Langley, he developed a fin design that resists spinout and -- in an unexpected development -- reduces drag and increases speed.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

VIDEO NEWS RELEASES:

"STORM SEEKERS": A team of scientists from Langley flies directly through thunderstorms in search of wind shear--strong, potentially hazardous downdrafts that can literally knock an unsuspecting plane out of the sky during an approach or landing. The goal is to evaluate a number of systems to warn pilots about wind shear. NASA Aeronautics and Space Report #261
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

"DEDICATED TO FLIGHT": Jack Reeder, a NASA Langley engineer and research pilot flew more than 200 different types of aircraft over a 40-year career. He was recently inducted along with Charles Lindbergh into the Aviation Hall of Fame in Michigan. Among his accomplishments, Reeder helped develop the P-51 Mustang, a highly-successful U.S. fighter in World War II, and the P1127, VTOL technology testbed for the Harrier jumpjet. NASA Aero and Space Report #261
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

PHOTO OPPORTUNITY -- ONE WEEK ONLY:

NIGHTTIME TEST OF LASER SYSTEM AT LANGLEY. The first ground testing of the LITE (Lidar In-Space Technology Experiment) begins at Langley in mid-April. Tests, which will last approximately one week, will use a powerful laser to measure atmospheric parameters like aerosols, temperature, density and cloud altitude and depth. LITE is scheduled to fly on the Shuttle in 1994. Photo opportunities of the ground testing and interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

FEATURE PHOTOGRAPHY:

AEROSPACE EXHIBITS: Impressive exhibits at the Virginia Air & Space Center are featured in photos by Langley photographer Fred D. Jones.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

TIME CAPSULE: The lowering of Langley's 75th Anniversary time capsule is documented in this set of photos by Fred D. Jones.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

- End -

NASA News

National Aeronautics and
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For Release:

April 13, 1993

RELEASE NO. 93-020

TWO NASA SPINOFFS NAMED TO TECHNOLOGY HALL OF FAME

A NASA technology developed for astronauts to keep them cool on the Lunar surface evolved, through the efforts NASA Langley Research Center and a national charitable organization, into liquid-cooled garments used for medical applications. This "cool suit" technology and NASA's patient monitoring device have been selected for induction into the U.S. Space Foundation's Technology Hall of Fame.

John Samos and Thayer Sheets will accept the Hall of Fame honors for NASA Langley at the April 15 Space Technology Hall of Fame banquet in Colorado Springs, Colorado. NASA Administrator Daniel Goldin will be keynote speaker. Samos was head of the Technology Transfer Office and Sheets was a technology utilization specialist at the time of the technology transfer.

The liquid-cooled garments that were worn inside the astronaut's space suits maintained their temperatures at comfortable levels by circulating chilled water through a series of tubes in the garments, work originally done at NASA's Ames Research Center and Johnson Space Center. A battery-powered pump circulated the water. This technology was adapted by Langley to meet real-life medical needs and is now used for patients suffering from multiple sclerosis (MS) and related neurologic disorders, cystic fibrosis, and hypohidrotic ectodermal dysplasia (HED).

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The cool suit technology has been successfully transferred to the medical and industrial fields. Through the efforts of the HED Foundation, its founder Sarah Moody, and NASA Langley personnel, 108 cooling garments have been donated to children without sweat glands (HED) as a method for dissipating their body heat. The HED Foundation was organized in 1988.

Since 1991, approximately 300 suits were sold to MS patients. And, in 1991, 400 liquid-cooled garments were used by the Army in the Persian Gulf. The cool suits are also used by race car drivers, hazardous materials handlers, nuclear reactor workers, and paper mill and shipyard personnel. The technology created a multi-million dollar business.

A second technology developed for NASA during the Mercury and Gemini space programs is also recognized for induction into this year's Space Technology Hall of Fame. A patient monitoring device--first developed by the Sierra Research Corp., under sponsorship of the U.S. Air Force and U.S. Army--was adopted and improved for the space program by NASA's Ames Research and Johnson Space Centers. It transmitted astronaut physiological data to Earth for monitoring and analysis.

The system, still used for astronaut monitoring today, uses telemetry technology to monitor patients around the Earth, enabling a patient to be monitored wirelessly from one site to a central station, where a nurse can simultaneously monitor the conditions of several patients. This enables heart patients, for example, to return home and still receive constant medical monitoring.

For more than 30 years, NASA's Technology Utilization Program has actively encouraged the secondary application of aerospace technology. During that time, more than 30,000 aerospace-originated innovations have found their way into everyday use. Collectively, these spinoffs represent a substantial return on the aerospace investment in terms of economic gain, lifestyle enhancement and solutions to problems of public concern.

Since 1988, the U.S. Space Foundation has selected space technologies that have made significant social and economic impact on people on Earth. There are currently 14 other technologies listed in the Hall of Fame.

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NASA News

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Hampton, Virginia 23681-0001

RELEASE NO. 93-26

For Release:

LANGLEY STORY OPPORTUNITIES -- MAY 1993

ARROW WING JET READIED FOR HIGH-SPEED CIVIL TRANSPORT TESTS. The NASA F-16XL aircraft is currently undergoing modifications for the first phase of a multi-year flight research program in support of the High Speed Civil Transport program. Tests are aimed at demonstrating a "high-lift" device to improve low-speed aerodynamics and reduce engine noise in airport community areas. The aircraft arrived at Langley in April. Available: Photos and graphics to illustrate aircraft, graphic of candidate high-lift devices, project and aircraft logo art.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

TRACE-A OZONE RESULTS STUDIED. Scientists from the United States, Brazil and Germany will meet May 10-14 in Norfolk, Va., to review results obtained during an international expedition spearheaded by NASA to investigate newly discovered concentrations of harmful ozone in the lower atmosphere over the tropical Atlantic Ocean. More than 200 scientists from 13 countries participated in investigations conducted last Fall. The TRACE-A (Transport & Atmospheric Chemistry Near the Equator-Atlantic) workshop is the first opportunity the scientists have had to evalute the extent to which this newly observed phenomena is linked to biomass burning in Africa and South America.
Interviews by appointment only. Graphics available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

SAMPEX RESULTS TO BE PRESENTED. Langley will participate in presenting findings from SAMPEX (Solar, Anomalous and Magnetosphere Particle Explorer), one of NASA's new small satellites launched last year. The presentation will be at the annual American Geophysical Union meeting May 25 at the Baltimore Convention Center. SAMPEX is an example of NASA's "cheaper, better, faster" approach to designing payloads. Photos and interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

- more -

MAY 11 TALK: DOES HUMAN ACTIVITY PRODUCE GLOBAL CHANGES? NASA researcher Dr. James G. Lawless will speak on "Mission to Planet Earth" May 11 at 2 p.m. as part of NASA Langley's Colloquium series. He will discuss how humans, through increasing population and the quest for improved quality of life, may be contributing to atmospheric changes in ways that are not yet understood. Candidates include the chemical destruction of the ozone layer and the build-up of atmospheric greenhouse gases.
PRESS BRIEFING AT 1:15 p.m. on May 11. Call for further details.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

LITE TRAVELS. Langley's LITE (Lidar In-Space Technology Experiment) is now at NASA's Goddard Space Flight Center undergoing electromagnetic testing to match LITE instrument needs with orbiter electrical systems. After several weeks of testing at Goddard, LITE will return to Langley before being shipped to Kennedy Space Center for launch processing. LITE is scheduled to fly in the Fall of 1994. LITE is NASA's first in-space laser system for atmospheric research. Photos, interviews and other materials available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

A LOOK AHEAD FOR JUNE. Two Langley experiments will fly onboard STS-57 in June:
o The Langley sponsored Get-Away Special student experiment payload "CAN DO" will be managed by students from seven states (including students in Poquoson, VA). Photographic and materials experiments will provide a real world learning experience.
o Langley's Gas Permeable Polymeric Materials flight experiment will test materials for many uses, including contact lenses for long-term wear and for use by pilots and astronauts.
Photos, video and materials available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer, 804-864-6122

FEATURE PHOTOGRAPHY/GRAPHICS:

FUTURE HIGH-SPEED FLIGHT DECKS. The next generation high-speed civil transport will leapfrog the British-French Concorde in several technology areas, to include advanced flight decks. Supersonic flight decks of the future will likely employ advanced sensors and panoramic, pictorial displays that will radically alter the look and feel of the cockpit. Photos available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

SPACE SHUTTLE AS 'X-PLANE'. Computer-generated images of this previously reported topic are available. The colorful images show how surface heating varies from part of the Shuttle Orbiter to another during atmospheric reentry. Photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 453-8375

- End -

NASA News

National Aeronautics and
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For Release:

May 20, 1993

RELEASE NO. 93-033

NASA'S INFRARED BALLOON EXPERIMENT SCHEDULED FOR LATE MAY LAUNCH IN NEW MEXICO

NASA Langley Research Center's IBEX (Infrared Balloon Experiment) will be launched in late May to validate the accuracy of the Upper Atmospheric Research Satellite's (UARS) ozone-related data measurements and to measure the effect of industrial bromine-containing gases on the ozone layer.

UARS data taken over central New Mexico will be obtained at the same time as IBEX data. This allows a direct comparison of the data from the satellite taken from space and with the IBEX balloon floating in the ozone layer. This will permit precise confirmation of satellite accuracy and help NASA better understand satellite readings.

Another flight goal is a measurement of possible bromine-induced ozone depletion, which may result from agricultural and industrial use of methyl bromide. The chemical is used as a fumigant in soils to kill pests that attack vegetables and fruits, to fumigate imported fresh fruits and vegetables, and to protect commodities like grain while they are held in storage.

The IBEX helium-filled balloon, when fully inflated at float altitude, is the size of one-and-a-half football fields (400 feet in diameter or 122 meters), and weighs 3,000 pounds (approximately 1,400 kilograms). The balloon material is similar to sandwich bag plastic.

The balloon will be launched from the NASA-operated National Scientific Balloon Facility in Fort Sumner, New Mexico, between May 21 and May 28, depending on weather conditions. The expected float altitude of 24 miles (38 kilometers or 127,000 feet) is reached about 2 hours after launch. Depending on float winds, flights can last up to 30 hours.

The instrument payload, which weights 2,800 pounds (approximately1,300 kilograms), includes the IBEX instrument and two instruments developed by the Jet Propulsion Laboratory, Pasadena Calif. The IBEX is a unique instrument in terms of its sensitivity and accuracy for detecting many gases.

The project is an international effort with representatives from the United States, Italy, and Britain.

-End-

NOTE TO EDITORS: Interviews and photos are available.

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For Release:

May 26, 1993

RELEASE NO. 93-034

JUNE 3 IS TARGET DATE FOR NEXT SHUTTLE MISSION

Space Shuttle Endeavour is preparing for launch on June 3 at 6:17 p.m. EDT. The mission, designated as STS-57, includes the retrieval of the European observation satellite EURECA and the first flight of a commercial spacelab facility known as Spacehab.

The 7-day mission will carry two payloads from NASA's Langley Research Center. The CAN DO experiment--an educational experiment sponsored by Langley and the Charleston County School District in South Carolina--includes involvement with students in the Poquoson School System in Southeastern Virginia. Student-designed experiments will fly on shuttle and 1,000 photos of the Earth will be taken to make observations and to document global change. Also, Langley's Gas Permeable Polymeric Materials (GPPM) experiment will determine if certain types of polymers (similar to contact lens plastic) made in low gravity while the Space Shuttle is in orbit are very different from the same polymers made at the same time on the ground.

If conditions permit, the mission may be extended by 1 day. The extra day will give two crew members the opportunity to perform an extravehicular activity (EVA) or spacewalk.

The STS-57 EVA will be the second in a series of spacewalks designed to refine training methods and expand the EVA experience level of astronauts, flight controllers and instructors. The spacewalk also will assist in refining several procedures being developed to service the Hubble Space Telescope on Shuttle Mission STS-61 in December.

Leading the STS-57 crew will be Mission Commander Ronald Grabe, Pilot Brian Duffy and Payload Commander David Low, who is also designated as a mission specialist. Other mission specialists are Nancy Sherlock, Janice Voss and Jeff Wisoff, a native of Norfolk, Va. This will be the fourth flight of Space Shuttle Endeavour and the 56th flight of the Space Shuttle system.

If we can assist with your news coverage of these events, call the NASA Langley Public Affairs Office at 864-6124.

-End-

NASA News

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Hampton, Virginia 23681-0001

RELEASE NO. 93-35

For Release:

LANGLEY STORY OPPORTUNITIES -- JUNE 1993

NASA TAKES STEP TOWARD HIGH SPEED RESEARCH TECHNOLOGY DEVELOPMENT. A milestone in the High Speed Research program will be reached soon when the "request for proposals" will be released for work on high speed civil transport airframe technologies. The U.S. aerospace industry will respond to NASA with proposals for how it would develop and verify aerodynamic, flight deck, and materials and structures technologies. Langley Research Center leads the NASA-industry effort to develop these technologies for a revolutionary aircraft envisioned to carry 300 passengers 5,000 nautical miles at more than twice the speed of sound.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

HIGH SPEED RESEARCH AT PARIS. The NASA exhibit at this year's biennual Paris Air Show will focus on high speed research for a new generation of airliners, with particular emphasis on environmental compatibility: Noise reduction, reduction in sonic boom and reduction in engine emissions. Show dates: June 10-20.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

JUNE LAUNCH: SHUTTLE ENDEAVOUR TO CARRY 2 LANGLEY PAYLOADS. STS-57 is expected to be launched mid-June. Endeavour will carry two Langley payloads and a local mission specialist, Dr. Peter J.K. "Jeff" Wisoff from Norfolk. The payloads are the CAN DO experiment, which includes direct participation by Poquoson School students, and the Gas Permeable Polymeric Materials experiment, which will study polymers in microgravity. The mission is scheduled for 7 days and 23 hours, with landing and take-off from Kennedy Space Center. Interviews, photos, CAN DO video.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

JUNE 14 TALK: PILOTLESS AIRCRAFT MONITOR ATMOSPHERE. Langley's June 14 Colloquium will feature James Anderson and his presentation on "The Role of Unmanned Aircraft in Global Change Research." He will address how pilotless aircraft are used for monitoring chemical changes in the atmosphere. Interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

FINDINGS SUGGEST SUN PLAYS BIGGER OZONE ROLE. Data from a new NASA satellite are leading scientists to believe that the sun plays a more prominent role in the composition of the Earth's protective ozone layer than previously thought. While scientists are still working to assess the complex set of negative and positive influences, this data suggests that the sun's high energy bombardment of the atmosphere may be triggering chemical reactions which influence the global ozone balance. This information comes from the first satellite in NASA's emerging stable of small, quickly mounted Explorer missions. The project is a joint effort between NASA and Germany. Photos, interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NEW MEXICO ATMOSPHERIC BALLOON LAUNCH. Langley's IBEX (Infrared Balloon Experiment) is set for launch sometime in the next few days to validate the accuracy of the Upper Atmospheric Research Satellite's (UARS) ozone related measurements and to measure the effect of industrial bromine-containing gases on the ozone layer. Bromine gases that may be in the atmosphere result from the use of methyl bromide by agricultural and related industries. The chemical is used as a fumigant in soils to kill pests that attack vegetables and fruits. Photos, interviews.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

LANGLEY LEADS COMMUNITY WITH UNIQUE PROGRAMS FOR THE DISABLED. Langley improves working conditions for disabled employees with a unique combination of efforts: An on-site, full-time interpreter, signing classes offered to all employees, modified vans and a five-year strategic plan for recruiting, hiring and accommodating the disabled. The Satellite Committee for People with Disabilities supports the disability program at the center and will be recognized June 25 at an awards ceremony in the HJE Reid Conference Center. Materials available, photo available mid June.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NEW NASA MEDIA GUIDE & PUBLIC AFFAIRS CONTACTS. The new NASA Media Guide is available free to news media and freelancers, by requesting a copy on your letterhead. Write to:
Office of Public Affairs, MS 115, NASA Langley Research Center, Hampton, VA 23681.

FEATURE PHOTOGRAPHY/GRAPHICS:

F-16XL ARRIVAL AND MODEL RESEARCH PHOTOS. Available are the first photographs of the single-seater F-16XL arrow-wing jet after arrival at Langley and colorful model F-16XL water tunnel and wind tunnel photographs. Color graphics and High Lift/Flight Test logos available. (Supports High Speed Research program. Please see first two items, p.1.)
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
Also available from NASA Headquarters Broadcast & Imaging (202) 358-1741

- End -

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RELEASE NO. 93-036 May 25, 1993

NASA SATELLITE LOOKS AT SUN'S ROLE IN OZONE CHEMISTRY

Data from a new NASA satellite will help scientists pin down one of the complex ways the Sun influences the chemical makeup of Earth's atmosphere, including the processes of ozone creation and destruction.

"We now have growing evidence that high-energy electrons bombard the upper atmosphere. They trigger chemical reactions which may significantly influence global ozone levels," said Linwood B. Callis, an atmospheric scientist at NASA's Langley Research Center, Hampton, Va.

The new data--from one of the experiments of NASA's Solar Anomalous and Magnetospheric Particle Explorer (SAMPEX)--will be used by scientists together with computer models to help assess how these electrons affect levels of ozone and other trace chemicals in the atmosphere. The electrons appear in sporadic bursts, most often when sunspots are at their minimum. At that time, solar wind variations lead to enhanced numbers of these electrons.

The atmospheric process is thought to work like this: The clash of incoming electrons with the atmosphere, among other effects, produces nitrogen compounds that can diminish stratospheric ozone. The number of electrons, and its relationship to the Sun's 11-year cycle, are now being examined with the new satellite measurements.

However, the nature of the nitrogen compounds complicates the issue. While the nitrogen compounds attack ozone, they also moderate the destructive effect that chlorine has on ozone. It is the chlorine, which occurs naturally and has been increasing as a result of human activities, that has received the most attention as the major nemesis of ozone.

-more-

"Now, we're seeing a whole new set of variables," says Dr. Daniel N. Baker, SAMPEX project scientist at NASA's Goddard Space Flight Center, Greenbelt, Md. "We now have to look seriously at this atmospheric influence and try to verify the effect on atmospheric chemistry, including ozone, by comparing SAMPEX data with other satellite measurements of these atmospheric constituents."

In addition to the electrons' effect on chemistry, Callis added, they may also influence global stratospheric temperatures, although these effects are far from determined.

SAMPEX is the first satellite in NASA's emerging stable of small, quickly mounted Explorer missions. The vehicle's Proton/Electron Telescope, built at the California Institute of Technology, has been measuring the energy and intensity of ultra high-speed electrons as they arrive from interplanetary space. SAMPEX has three other instruments measuring energetic particles arriving at Earth from the solar atmosphere and interstellar space. Launched in 1992 after only three years in development, the satellite is a collaborative effort between NASA and Germany.

SAMPEX also represents another step in what has been an outer space scientific detective story. Beginning in the early 1970s, atmospheric scientists have compiled a growing body of evidence to explain the effects of the Sun on the atmosphere by using a series of small satellites. NASA's atmospheric exploration has used progressively sophisticated satellite instruments--such as the Stratospheric Aerosol and Gas Experiments, the Solar Backscatter Ultraviolet Experiment, the Total Ozone Mapping Spectrometer and the Upper Atmosphere Research Satellite--to measure ozone, related chemicals and solar energy. Now SAMPEX, by systematically measuring electrons reaching the atmosphere, will allow scientists to observe simultaneously the electron input and the response of the atmosphere.

Since the mid-1800s, when the sunspot cycle was discovered, scientists have looked for links between the Sun's changing face and what was happening on Earth. From observing the relation of sunspots to magnetic "storms" to validating the 11-year solar energy cycle, this cosmic correlation has been relentlesly pursued. "Now," Callis said, "we are exploring a new connection that, in computer models, appears to affect global ozone, and with it comes a whole new series of questions for us to examine."

These findings and 12 other SAMPEX-related reports are among the presentations to be given at the American Geophysical Union meeting beginning May 25 in Baltimore, Md. Callis, Baker and their SAMPEX colleages will deliver the high energy electron and ozone report.

-end-

NOTE TO EDITORS: A color illustration is available from the Office of Public Affairs, Langley Research Center, Hampton, Va. Call 804-864-3296 and ask for Craig Murden.

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July 22, 1993

RELEASE NO. 93-040

ADAMS NAMED ASSISTANT DIRECTOR AT NASA LANGLEY

Dr. Belinda H. Adams has been named to the new position of assistant director of NASA Langley Research Center, a Senior Executive Service appointment.

In her new post, Adams participates in the overall management of Langley. She assists in coordinating, directing, and executing programs consistent with the roles and capabilities of the center. Adams leads strategic planning activities and overall intra-center communications, manages special studies, oversees analyses and assignments that involve interdisciplinary or interorganizational approaches, and directs the center's continuous improvement process.

Adams began her Langley career in 1963 as an aerospace technologist in the Analysis and Computation Division. She served as operations research analyst from 1970-1973; as assistant head of the Institutional Program Branch in the Programs and Resources Division (PRD) from 1973-1975; and as branch head in PRD from 1975-1980. She was named assistant division chief in 1981 and chief of PRD in 1984. Prior to her current position, Adams was chief of the Human Resources Management Division.

She attended the Massachusetts Institute of Technology (MIT) from 1989 to 1990 as NASA's Sloan Fellow. When the program concluded, she was detailed briefly to NASA Headquarters in Washington, D.C.

The Mississippi native has a doctorate in business administration from the University of North Carolina, a master of science degree from MIT, a bachelor of science degree from the University of Mississippi, and an associate degree from Hinds Junior College in Mississippi.

She received a NASA Exceptional Service Medal in 1992.

Dr. Adams and her husband Bill live in Yorktown, Va. They have two daughters, Andrea and Stephanie.

- End -

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June 16, 1993

RELEASE NO. 93-041

STRUHAR NAMED COMPTROLLER AT NASA LANGLEY

Joseph R. Struhar has been named comptroller, a new position that reports to the Center Director, at NASA Langley Research Center.

Creation of the senior executive service position fulfills a recent requirement that each NASA Center have a comptroller.

In this position, he provides total overview of Center resources and financial management related to programs and operations, including all resources elements of the Center planning, programming and budgeting process. He also reviews, assesses and validates Center resource requirements, including recommendations to the Agency Chief Financial Officer for total resources approvals and authorizations.

He began his Langley career in 1960 as a staff accountant and was named head of the Appropriation Accounting Section in 1965. He was later named assistant head (1966) and head (1970) of the Accounting Branch. In 1973, he was selected as assistant chief of the Financial Management Division and, in 1981, he was promoted to chief of the division. In 1990, he was selected as chief of the Programs and Resources Division.

Struhar received a bachelor and master of science degrees in business administration from Duquesne University and The College of William and Mary, respectively.

A past president of the Association of Government Accountants, Struhar received a NASA Exceptional Service Medal in 1988.

He and his wife Catherine live in Hampton, Va. They have two sons.

-end-

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Hampton, Virginia 23681-0001

RELEASE NO. 93-45

For Release:

LANGLEY STORY OPPORTUNITIES -- JULY 1993

NATIONAL AERO-SPACE PLANE 'SUCCESS STORY' JULY 2. An exhibit of technology transfer "success stories" involving the National Aero-Space Plane (NASP) program will be on display in the H.J.E. Reid Conference Center, 14 Langley Blvd., NASA Langley Research Center, Hampton. Experts will be on hand to discuss technology transfer results that benefit a wide range of American business, including the aircraft, automotive and medical industries. NASA's Jim Arrington will give an overview from 10-10:45 a.m. on NASP technology transfer. Photo, video opportunities.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

JULY 14 TALK: GENERAL AVIATION SAFETY RENAISSANCE. The decades-long dream of personal aviation has a new wrinkle: New cockpit and satellite tracking technologies promise a day when flying is easier, more accessable and safer. NASA Langley's Dr. Bruce Holmes will speak on "Technology and general aviation safety" at the Naval Air Station, Norfolk, as part of an accident prevention program from 7-9:30 p.m., July 14. The program is sponsored by the Norfolk Navy Flying Club and the FAA.
CLUB CONTACT FOR DIRECTIONS, ACCESS: John Seibert (804) 423-3331
PUBLIC AFFAIRS CONTACT FOR HOLMES PRESENTATION: Keith Henry (804) 864-6120

NATIONAL SPACE WEEK: JULY 18-24. Langley researchers will speak on robotics, structures in space, "Mission to Planet Earth" and future space taxis and participate in a panel discussion on Apollo (moon) and Viking (Mars) missions. Presentations are at the Virginia Air and Space Center and Hampton Roads History Center, downtown Hampton. Interviews, historic photos and three space history feature write-ups available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

JULY 19 TALK: LAMINAR FLOW -- THE 'HOLY GRAIL' OF AERONAUTICS. NASA Langley researcher Dr. Faye Collier, Jr. will speak on "Advances in Laminar Flow Control Technology for Transport Aircraft" July 19 at 2 p.m. as part of NASA Langley's Colloquium series. He will discuss how decades of research for smoothing the flow over a wing may finally pay off for U.S. airplane manufacturers, airlines and the flying public by allowing an aircraft to slip through the air using less fuel. Press briefing at 1:15 p.m.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

NEW TECHNOLOGY USES LIGHT TO CONTROL AIRCRAFT ENGINE. An important step has been taken toward lightweight, interference-free control of commercial transport aircraft engines with the recent demonstration of fly-by-light engine controls and supporting hardware. NASA Langley's modified Boeing 737, essentially a flying laboratory, was successfully flown by use of a fiber optics system that sensed throttle position and controlled fuel flow to one of its two engines. NASA is working with McDonnell Douglas Aerospace, Long Beach, Calif., United Technologies/Pratt and Whitney and United Technologies/Hamilton Standard, both in Conn.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

MINIWINGS, THE 'ANSER' FOR FIGHTER PERFORMANCE. Small wing surfaces, only inches wide, deployed from each side of a fighter aircraft's nose are expected to make a dramatic diffference in the aircraft's effectiveness during aerial combat. The Langley-designed and fabricated "strakes" have been incorporated into a full-sized nose cone, scheduled for delivery to NASA Dryden Flight Facility, Edwards, Calif. in a few weeks, where they will be flight tested on a highly-modified NASA F-18 aircraft next year. ANSER (Actuated Nose Strakes for Enhanced Rolling) interviews, hardware demo, photos available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

LANGLEY BIOMASS BURNING RESEARCH MOVES TO SIBERIA. After recently leading a similar expedition to Brazil and participating in another in Africa, Langley atmospheric scientists are in Siberia with their Russian colleagues measuring the content of emissions from forest and tundra fires. These emissions are thought to influence global climate change. Details of the Siberian investigation should be available upon the return of the Langley scientists in mid-July. Interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

HALF HELICOPTER, HALF AIRPLANE. An unusual aircraft -- half helicopter and half airplane -- is being studied at NASA Langley. The McDonnell Douglas concept features a convertible center wing that rotates for takeoff, hover, low-speed flight and landing. For high-speed flight, the center wing is stopped and becomes a conventional fixed wing. According to its designers, the "canard/rotor/wing" concept combines the operational advantages of a helicopter with cruise efficiency approaching that of an airplane. Photo, interviews available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
McDONNELL DOUGLAS CONTACT: Hal Klopper (602) 891-5519

OSHKOSH '93. NASA Langley will support the world's largest fly-in with speakers on diverse aeronautics topics and with displays of NASA-developed technology. NASA, America's aeronautics agency, transfers technolgy to the general aviation (lightplane) industry and to thousands of hands-on aviation enthusiasts at Oshkosh, Wisc. A special story opportunities news release will be issued prior to the annual Experimental Aircraft Association/Oshkosh Convention & Air Show set for July 29-Aug. 4 at Wittman Field.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

- End -

NASA News

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For Release:
July 7, 1993

H. Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6124)

RELEASE: 93-48

NASA AWARDS HIGH-SPEED, AIR-TRANSPORT-MATERIALS STUDY CONTRACTS

NASA has awarded contracts to three U.S. aerospace companies to develop materials and fabrication technology for a future U.S. high-speed civil transport.

This research could allow the U.S. industry to develop and manufacture an airplane that would, as envisioned, fly 300 passengers across the Atlantic or Pacific at 2.4 times the speed of sound -- approximately 1,350 mph.

At that speed, a flight from Los Angeles to Tokyo would take about 4 hours, compared to 10 hours in a modern subsonic wide-bodied jet.

Program planners estimate that production and maintenance of a fleet of 500 to 1,000 high-speed civil transports could create 140,000 new jobs and generate $200 billion in sales, keeping passenger ticket prices down and assuring U.S. dominance in the world commercial transport market.

Technology for a future high-speed civil transport is being worked through NASA's High-Speed Research Program Office, Washington, D.C. Langley Research Center, Hampton, Va., is the lead NASA research center.

A $25.4 million contract was awarded to Boeing Commercial Airplane Group, Seattle; a $27.3 million contract was awarded to Lockheed Aeronautical Systems Co., Marietta, Ga.; and a $23.9 million contract went to McDonnell Douglas Aerospace,

- more -

Long Beach, Calif. These amounts include money for optional materials development efforts.

Work under the 5-year contracts will focus on development and testing of promising high temperature materials and fabrication techniques and investigation of long-term durability of structural components.

Materials to be studied include metals such as intermediate-temperature aluminum and aluminum-lithium alloys, high-temperature titanium alloys, high-temperature polymers and composites and even higher temperature metal-matrix composites and carbon-carbon composites.

Mathematical models will be developed that describe materials damage onset and progression to predict useful service life. Mechanical tests of structural elements will simulate long-term flight conditions to verify the mathematical models.

-end-

NASA News

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For Release:

July 9, 1993

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RELEASE NO. 93-50a

FRED WEICK -- GREAT AMERICAN AVIATION PIONEER DIES AT 93

One of the nation's earliest aviation pioneers -- airmail pilot, research engineer, aircraft designer -- is dead at 93. Fred Weick, whose genius touched virtually every aeronautical discipline in a career which spanned a half century, died July 8 in Vero Beach, Fla.

Weick, a contemporary of aviation legends Charles Lindbergh and Amelia Earhart, did not receive the same attention as his more glamorous colleagues yet the contributions he brought to the country's struggling aircraft industry arguably outstripped any of his peers.

One of the first university graduates to apply his degree to a career in aeronautics, Weick was also one of the first engineers hired by the original U.S. Air Mail Service. His efforts in the early 1920s to establish emergency fields for night-flying mail pilots were a pioneering challenge of the first order.

In advancing aeronautical technology, he helped design the first wind tunnel devoted to full scale propeller research and wrote a textbook on propeller design now considered a classic. In that period Weick worked for NASA's predecessor organization, the National Advisory Committee for Aeronautics (NACA) at its Langley Aeronautical Laboratory, Hampton, Va. This, too, was a pioneering endeavor as the Langley facility was the very first of its kind. (Note: NACA is pronounced "EN-AY-CEE-AY" not "nacka.")

It was also at Langley that Weick reached another pioneering plateau. He headed the development of streamlined, low-drag engine cowling technology which was to advance aircraft performance dramatically. The NACA cowling first revolutionized civil air transport by making aircraft faster and more profitable. It also found application on the bombers and fighters which played a prominent role in the air battles over Europe and the Pacific during World War II.

- more -

For this engineering breakthrough, he won the prestigious Collier Trophy for NACA in 1929. Another effect of his engineering versatility was the increasing reputation for excellence in aeronautical research which NACA earned among its supporters in Congress. Modest funding for NACA's Langley Aeronautical Laboratory was sustained through the lean Depression years thanks, in part, to his work.

Weick's passion for safety was evident when he built an experimental airplane in the early 1930's aimed at making flying as easy and safe as driving the family auto. In addition to the integrated controls for ease of flying, he incorporated the tricycle landing gear arrangement which is now the standard for virtually all the world's aircraft including the space shuttle.

Later in the decade, he improved on that design with the now famous Ercoupe, the two-seat, all-metal, low-wing aircraft which was so easy and safe to fly that many students mastered it in five hours or less. Half of the 6,000 Ercoupes built are still flying today, a tribute to Weick's engineering foresight.

Weick's prevailing goal was to make aviation directly accessible to middle-class Americans. His work with Piper and Cessna aircraft companies set safety standards of lasting benefit to both the agricultural airplane (crop duster) and general aviation industries.

His own words characterize this remarkable aviation pioneer's dedication to that pursuit: "I feel very fortunate to have been alive throughout the early ventures of atmospheric flight and to have been one of the multitude working to further them. My activities in aeronautics have enriched my life greatly. It gives me satisfaction to find that many of the improvements that we worked on more than half a century ago are still in general use."

Services will be held Sunday, July 11, 3 p.m. at the First Presbyterian Church in Vero Beach, Fla. Weick requested that donations, in lieu of flowers, be sent to the Fred E. Weick Scholarship Fund, Embry Riddle Aeronautical University, Daytona Beach, Fla. 32114-3900.

Weick is survived by his 3 children, Donald V. Weick of Camden, S.C., Mrs. Elizabeth J. Weick of Greenbelt, Md., and Richard F. Weick of London, Ontario, Canada; 9 grandchildren, 11 great grandchildren, 2 great great grandchildren, and 2 brothers, Arthur Weick of Winterhaven, Fla. and George Weick of Ft. Lauderdale, Fla.

- End -

NASA News

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For Release:

Marny Skora
804/864-3315

July 15, 1993

Release No. 93-051

WHO:	NASA Langley Research Center
WHAT:	Technology Opportunities Showcase
WHEN:	October 19, 20, 21, 1993
WHERE:	Hampton, Virginia
WHY:	To highlight NASA's dual-use technology as a cornerstone in strengthening U.S. competitiveness in the world marketplace

NASA to Showcase Dual-Use Technology at Business Expo

An aggressive program inviting private enterprise to profit from the government's aeronautics and space research is the focus of a three-day exposition at NASA's Langley Research Center, Hampton, Va., October 19-21.

NASA and its predecessor the National Advisory Committee for Aeronautics (NACA) have been part of the technology transfer process since World War I. Commercial aviation has been a major benefactor of aeronautical research spin-offs and every taxpayer has reaped rewards from the myriad of commercial applications of space-age technologies.

Now, under the Administration's new direction to place government in a pivotal role to help industry, non-aerospace companies, small and minority business and universities profit from Federal lab innovations, the Agency is redoubling its efforts to share critical research results.

Langley's Technology Opportunities Showcase (TOPS) will highlight and encourage technology investment partnerships with the American industrial community in a variety of disciplines.

(more)

The Center features advanced research and development in high-speed aeronautics, subsonics and hypersonics, high-performance aircraft, general aviation, large-scale computing, atmospherics, space transportation and spacecraft. Research results and plans will be showcased in these and other areas:

Advanced Materials	Manufacturing Processes
Instrumentation	Nondestructive Evaluation
Measurement Technology	Analytical Techniques
Structures and Dynamics	Avionics
Automation and Robotics	Optics and Laser Technology
Data Systems	Information Sciences
Environmental Technology	Atmospherics

Langley's senior managers, scientists, engineers and technicians will be on hand to greet attending business representatives and to detail research efforts in each area of interest. Supporting research documentation together with procedures for dual-use partnerships will be featured.

For more information, contact Jim Raper, TOPS project manager, at NASA Langley Research Center, Mail Stop 480, Hampton, VA., 23681-0001. Phone (804) 864-8886 or FAX (804) 864-8885.

-end-

National Aeronautics and
Space Administration
Langley Research Center
Hampton, VA 23681-0001

Reply to Attn of:

Catharine G. Schauer
(804) 864-6122/6124

July 20, 1993

Release No. 93-53

MASSENBERG HEADS NEW OFFICE OF EDUCATION AT NASA LANGLEY

Dr. Samuel E. Massenberg has been selected for the newly created post of Director for Education at NASA's Langley Research Center, Hampton, Virginia.

The Education Office coordinates all education-related efforts at Langley. "We're concentrating on using new electronic technology, such as interactive television, to reach pre-college institutions in our five state area," Massenberg explains. "This will enable us to reach students in remote areas through satellite television and to complement what they are learning in the classroom. We will encourage an understanding of aerospace, its importance to industry and its relationship to the math and science areas."

Other education goals are to work with university research and training grants, to provide scholarships and fellowships to students and educators and also support research centers, and to support research institutes and provide program evaluation.

The new Directorate is divided into four offices: Education Technology and Distance Learning, University Affairs Programs, Pre-College Programs, and Institutes and Evaluation.

"All of our efforts are tied together by our CARES--Coordinate Academic Research Enhancement and Support--philosophy," Massenberg states. "This provides linkage between the components in our office and our culturally-diverse customers to ensure we keep the best students in educational programs, especially in the math and science areas. We hope to develop new funding methods to support undergraduate student research scholars.

"NASA supports national efforts to re-emphasize the importance of all American students becoming literate in science and mathematics," Massenberg said. "As a nation, we

-More-

must be technologically focused if we are to remain competitive in the world economy. My new position allows me to assist the NASA effort to inspire the students and teachers of the country--pre-school through graduate level education--and allows the Agency to make a difference. We are dedicated to providing support and leadership for all of our customers in the educational community."

Massenberg joined the Langley staff as an employee development specialist in 1980, after a distinguished career as a pilot and engineering officer in the U.S. Air Force and as dean of men at Hampton University. In 1981, he was named coordinator of the Career Development Center and, a year later, assumed the University Affairs Officer position, where he handled research grants between Langley and more than 100 universities, and he managed all university-related programs involving professors, graduate and undergraduate students. In 1991, Massenberg relocated to NASA Headquarters in Washington, D.C., to serve as director of the Minority University Research and Education Programs Division, a Senior Executive Service position.

Massenberg earned a bachelor's degree in management from Ohio State University, a master's degree in counseling and guidance from North Carolina A & T State University, and a doctorate in higher education administration from Virginia Polytechnic Institute and State University.

He is the recipient of numerous honors including a NASA Exceptional Service Medal, Virginia Polytechnic Institute and State University's Distinguished Alumnus Award, and a NASA Outstanding Leadership Award.

-End-

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

Catharine G. Schauer
804-864-6122/4

For Release:
July 27, 1993

Release No. 93-055

NOTE TO EDITORS:
LECTURE ADDRESSES FUZZY LOGIC AND ITS APPLICATIONS

Professor Lotfi A. Zadeh will speak on "Fuzzy Logic and Its Applications" August 9 at 2 p.m. as part of NASA Langley's Colloquium series.

Fuzzy logic has been and continues to be controversial. It offers a much better model for human reasoning than the traditional logical systems which are intolerant of imprecision and partial truth. The concept of a linguistic variable provides a computational framework for describing the relation between two or more variables in qualitative, linguistic terms -- for example, a linguistic variable of its values might be comparing young, very young, quite young, not very old, etc.

The findings of fuzzy logic have applications in many fields ranging from medical expert systems and image analysis to the control of cement kilns and subway trains. Such logic is employed with success to enhance the IQ of cameras, washing machines, vacuum cleaners and camcorders in everyday use.

Zadeh is professor of computer science in the electrical engineering and computer science department at the University of California at Berkeley. He is currently doing research on inferences from data bases that are incomplete or not totally reliable.

The presentation and a press briefing will be held at Langley H.J.E. Reid Conference Center, 14 Langley Blvd. Please call the Office of Public Affairs at 864-6124 by noon on Monday, August 9, if you plan to attend the 1:15 p.m. press briefing.

-End-

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release:

RELEASE NO. 93-057

LANGLEY STORY OPPORTUNITIES -- AUGUST 1993

OSHKOSH '93 OPENS. NASA Langley is supporting the world's largest fly-in with speakers on diverse aeronautics topics and with displays of NASA-developed technology. NASA, America's aeronautics agency, transfers technology to the general aviation (lightplane) industry and to thousands of hands-on aviation enthusiasts at Oshkosh, Wisc. The annual Experimental Aircraft Association/Oshkosh Convention & Air Show runs from July 29-Aug. 4.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

AUGUST 9 TALK: FUZZY LOGIC CAN BE LOGICAL. Professor Lotfi A. Zadeh will speak on "Fuzzy Logic and its Applications" Aug. 9 at 2 p.m. as part of NASA Langley's Colloquium series. Fuzzy logic uses graded or qualified statements -- rather than ones that are strictly true or false -- to enable computers to arrive at definitive answers. It offers a much better model for human reasoning than the traditional logical systems which are intolerant of imprecision and partial truth. The presentation will be held at Langley's H.J.E. Reid Conference Center, 14 Langley Blvd. Press briefing at 1:15 p.m.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

FUTURE COMMERCIAL SPACE TRANSPORTATION STUDY UNDERWAY. NASA Langley Research Center and five leading aerospace companies are working together to evaluate the potential for new markets that might be created if a low-cost commercial space transportation system was available. Through existing Langley contracts, Boeing, General Dynamics, Lockheed, Martin Marietta and Rockwell International will conduct a commercial space transportation study (CSTS) aimed at increasing the use of space and lowering the cost of space access. Interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

NASA News

National Aeronautics and
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Hampton, Virginia 23681-0001

For Release:

August 1993

H. Keith Henry
(804) 864-6120/6124
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Release No. 93-058

Photo No. L-93-5257

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AERO-SPACE PLANE ENGINE TESTED AT 5,500 MPH

A supersonic combustion ramjet (scramjet) engine between test runs at NASA Langley Research Center, Hampton, Va. Designed and built by Rocketdyne, the Subscale Parametric Engine (SXPE) is part of the joint National Aero-Space Plane Program sponsored by the Department of Defense and NASA. Tests in the Langley Arc-Heated Scramjet Test Facility began in April and will continue through the end of the year. It is being tested up to speeds of Mach 8, or approximately 5,500 mph. The concept is a candidate for an eventual flight demonstration. A larger-scale version of the concept, the Concept Demonstration Engine (CDE), will be tested in Langley's newly-upgraded 8-Foot High Temperature Tunnel later this year.

NASA Langley Research Center, Hampton, Va., is NASA's lead center for the National Aero-Space Plane Program.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration
photo by Fred D. Jones

NASA News

National Aeronautics and
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Kirsten Williams
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For Release:
July 28, 1993

Release: 93-059

NASA ADAPTING UNIQUE X-RAY SYSTEM TO INSPECT AIRCRAFT

NASA is adapting an existing, cutting-edge x-ray system to improve inspections of aging aircraft while saving American industries money.

The x-ray system, which combines TV-like scanning by x-ray beams with digital data acquisition, was originally intended for medical, dental and other industrial purposes. Researchers at NASA's Langley Research Center, Hampton, Va., have devised several unique aeronautical and aerospace applications for the system.

"We want to take advantage of a novel system, slightly modify it and use it for aircraft," said Dr. Joseph Heyman, Head of Langley's Nondestructive Evaluation Sciences Branch. "We will use it for measuring composite materials, for assessing damage growth in materials and for supporting tests to assess how structures behave under stress."

To enhance safe air travel, Langley will adapt the system to inspect aircraft wings, turbines, and propeller blades for corrosion, cracks and disbonding. "This research is part of our mandate to work with the Federal Aviation Administration to improve safety and reliability," Heyman said.

Because the system yields depth information, this x-ray technique also may be used by NASA to view how fibers mesh in three-dimensional composites and to monitor them for internal damage. Other potential uses include checking for changes in solid rocket fuel over time.

"It's such a broad applications area," Heyman said. "I see it as a general purpose tool for NASA and for industry."

Before NASA can employ the machine, researchers must miniaturize the

-more-

system's sensors. They can then be inserted into internal structures to inspect entire aircraft, including hard-to-reach corners and crevices. Under a NASA contract, the Digiray Corp., which developed, patented, and marketed the system, has boosted its power so thicker aircraft parts can be imaged.

Langley researchers also must come up with methods to ensure the accuracy of the data and to enhance interpretation of the x-ray image. "We need to develop computational models that can take the data we obtain using the Digiray system and essentially map it into something that can be quantitatively interpreted," said Dr. William Winfree, a NASA senior researcher.

"Other evaluation methods like ultrasonics and thermography exist, but are used for different purposes," Winfree added. "We believe that these types of technologies, which improve image quality, permit reliable airframe inspection at reduced cost."

Transferring the Technology

NASA hopes to sign a memorandum of agreement with Digiray Corp. that approves Langley's applications and adaptations. NASA has a rigorous technology transfer program to let aerospace technology permeate the private sector.

Langley researchers will share these unique uses of the x-ray technology with commercial air fleets, as well as with other industries. There also are potential spin-off uses, such as improved medical x-rays and assembly-line part scanning to control production quality.

"This technology cooperation will expand the use for this product and will help U.S. industries maintain product quality," Heyman said. "We as a national lab should be a resource for U.S. industry, helping them become more competitive."

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NASA News

National Aeronautics and
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AC 713 483-5111

For Release:

Barbara Schwartz
RELEASE: 93-060

August 3, 1993
11 a.m. CDT

ASTRONAUT BAGIAN TAKES LEAVE OF ABSENCE

Astronaut James P. Bagian, M.D., P.E., is taking a leave of absence from NASA to work as Vice-President of Corporate Development and Medical Affairs at Somanetics Corp., Troy, Mich. Bagian will use his medical and engineering expertise to head up the company's clinical research activities.

Bagian became an astronaut in July 1980 and took part in the planning and provision of emergency medical and rescue support for the first 6 Space Shuttle flights. He was a mission specialist on Space Shuttle missions STS-29 in March 1989 and on STS-40 in June 1991.

On his first Shuttle flight, Bagian was the principal investigator for an experiment to study the changes of cerebral blood flow and its relationship to space adaptation syndrome and space motion sickness. He was the first to treat space sickness with the drug Phenergan by intramuscular injection, which was the first successful treatment regimen for the symptoms. This method now has been adopted by NASA as the standard of care for the control of space sickness in Shuttle crews.

Bagian's second Shuttle flight was the first Spacelab Life Sciences mission, and the crew members performed experiments which explored how the heart, blood vessels, lungs, kidneys and hormone-secreting glands respond to microgravity, the causes of space sickness and changes in muscles, bones and cells which occur in humans during space flight.

Bagian will return to flight status upon his return to NASA.

-end-

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For Release:

August 6, 1993

RELEASE NO. 93-060

NASA AWARDS DISTINGUISHED PUBIC SERVICE MEDAL TO GEORGE WASHINGTON UNIVERSITY ASSOCIATE DIRECTOR

NASA recognized Dr. John L. Whitesides, associate director for George Washington University's Joint Institute for Advancement of Flight Studies, with a Distinguished Public Service Medal at a recent NASA awards ceremony.

Whitesides' medal was for developing the Joint Institute for the Advancement of Flight Services Program which provides continuing and outstanding contributions to the on-site graduate research and education opportunities at NASA's Langley Research Center in Hampton, Va.

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NASA News

National Aeronautics and
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For Release:

Barbara Schwartz
RELEASE: 93-061

August 3, 1993
11 a.m. CDT

PAYLOAD COMMANDERS NAMED FOR FUTURE SHUTTLE MISSIONS

Astronauts Tamara E. Jernigan, Ph.D., Thomas David Jones, Ph.D., James S. Voss, and Ellen Ochoa, Ph.D., have been named payload commanders on upcoming Space Shuttle missions.

Jernigan, 37, who holds degrees in engineering science, space physics and astronomy, is Payload Commander on the STS-67 Astro-2 mission scheduled for late 1994 aboard Columbia. Astro-2 is a mission to study the far ultraviolet spectra of faint astronomical objects using imaging and spectroscopy and to study the polarization of ultraviolet light coming from hot stars and galaxies.

Jernigan was a mission specialist on STS-40 Spacelab Life Sciences-1 in June 1991 and on STS-52, a mission to deploy the Laser Geodynamic Satellite to measure the movement of the Earth's crust, to operate the U.S. Microgravity Payload-01 and to test the Space Vision System developed by the Canadian Space Agency, in October 1992.

Jones, 38, is Payload Commander on the STS-68 Space Radar Laboratory-2 (SRL-2) mission scheduled for late 1994 aboard Atlantis. SRL-2 will take radar images of the Earth's surface for Earth system sciences studies including geology, geography, hydrology, oceanography, agronomy and botany.

Jones has a doctorate in planetary science and is a mission specialist on SRL-1 in the spring of 1994.

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U.S.Gov't

Voss, 44, who has a master of science degree in aerospace engineering sciences and is a USA Lieutenant Colonel, is Payload Commander on the STS-69 SPACEHAB-04 and the Shuttle Pallet Satellite-III scheduled for early 1995 aboard Discovery. SPACEHAB is a complement of commercial experiments flown in a pressurized module in the Shuttle's cargo bay as a supplement to the middeck area of the orbiter. SPAS-III is a group of instruments which will measure the atmosphere around the orbiter and the background clutter in the Earth's atmosphere.

Voss was a Mission Specialist on STS-44 in November 1991, a mission to deploy a Defense Support Program satellite and to conduct Military Man in Space experiments, radiation monitoring experiments and numerous medical tests to support longer duration Shuttle flights. He also was a mission specialist on STS-53 in December 1992, a mission to deploy a classified Department of Defense payload DOD-1 and to conduct Military Man in Space and NASA experiments.

Ochoa, 35, is Payload Commander on the STS-66 Atmospheric Laboratory for Applications and Science-3 mission scheduled for the fall of 1994 aboard Endeavour. ATLAS-3 continues the series of Spacelab flights to study the energy of the Sun during an 11-year solar cycle and to learn how changes in the Sun's irradiance affect the Earth's climate and environment.

Ochoa has master of science and doctorate degrees in electrical engineering. She was a Mission Specialist on STS-56 in April 1993, the ATLAS-2 mission.

-end-

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For Release:

August 6, 1993

RELEASE NO. 93-061A

NASA AWARDS OUTSTANDING LEADERSHIP MEDAL TO JOSEPH R. CHAMBERS

NASA Langley Research Center recognized Joseph R. Chambers, Division Chief of the Center's Flight Applications Division, with an Outstanding Leadership Medal at Langley's annual awards ceremony recently.

Chambers received the medal for outstanding leadership and management of research in the high-angle-of-attack technology and laminar flow control programs, producing extremely significant advances in technology for military and civil aircraft.

NASA Langley Research Center, the nation's first civil aeronautical research laboratory, is located in Hampton, Va.

- End -

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For Release:

August 6, 1993

RELEASE NO. 93-061B

NASA AWARDS OUTSTANDING LEADERSHIP MEDAL TO STEWART L. OCHELTREE

NASA Langley Research Center recognized Stewart L. Ocheltree, Assistant Chief of the Center's Instrument Research Division, with an Outstanding Leadership Medal at Langley's annual awards ceremony recently.

Ocheltree received the medal for outstanding leadership in establishing and advocating an Agency and Center aerospace measurement technology program that advances the state of the art with focused research, development and application tasks.

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For Release:

August 6, 1993

RELEASE NO. 93-062

NASA LANGLEY AWARDS EEO MEDAL TO DONNA M. SPELLER

NASA Langley Research Center recognized Donna M. Speller, program analyst for the Center's Analysis and Computation Division, with an Equal Employment Opportunity Medal at Langley's annual awards ceremony recently.

Speller received the medal for outstanding leadership and significant contributions in advancing equal opportunity at the Langley Research Center and in the local community.

She is the former chairperson of Langley's Federal Women's Program Committee.

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- End -

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For Release:

August 6, 1993

RELEASE NO. 93-063A

NASA LANGLEY AWARDS PUBLIC SERVICE MEDAL TO CHRISTOPHER NEWPORT UNIVERSITY PROFESSOR

NASA Langley Research Center recognized Alfred M. Buoncristiani, a professor at Christopher Newport University, with a Public Service Medal at Langley's annual awards ceremony recently.

Buoncristiani received the medal for significant contributions to NASA's Advanced Laser Systems Development Programs for use in spaceborne remote sensing.

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For Release:

August 6, 1993

RELEASE NO. 93-063B

NASA LANGLEY AWARDS PUBLIC SERVICE MEDAL TO CLEMSON UNIVERSITY PROFESSOR

NASA Langley Research Center recognized Gene Haertling, a professor at Clemson University, with a Public Service Medal at Langley's annual awards ceremony recently.

Haertling received the medal for contributions of national significance in new high-technology ceramics, including piezo-electric material matrices and high-temperature superconductive materials concepts.

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- End -

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For Release:

August 6, 1993

RELEASE NO. 93-063C

NASA LANGLEY AWARDS PUBLIC SERVICE MEDAL TO DAVID LAHTI OF GENERAL ELECTRIC AIRCRAFT ENGINES

NASA Langley Research Center recognized David J. Lahti, of General Electric Aircraft Engines, with a Public Service Medal at Langley's annual awards ceremony recently.

Lahti received the medal for outstanding leadership and technical direction of the development of laminar flow control drag reduction techniques applied to modern turbofan engine nacelles.

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- End -

NASA News

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For Release:

August 6, 1993

RELEASE NO. 93-063D

NASA LANGLEY AWARDS PUBLIC SERVICE MEDAL TO OLD DOMINION UNIVERSITY PROFESSOR

NASA Langley Research Center recognized Oktay Baysal, a professor at Old Dominion University, with a Public Service Medal at Langley's annual awards ceremony recently.

Baysal received the medal for exceptional contributions to NASA's basic research and technology program through personal research and the direction of graduate research.

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- End -

NASA News

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For Release:

August 6, 1993

RELEASE NO. 93-063E

NASA LANGLEY AWARDS PUBLIC SERVICE MEDAL TO JIM PENLAND

NASA Langley Research Center recognized Jim A. Penland, a distinguished research associate, with a Public Service Medal at Langley's annual awards ceremony recently.

A NASA retiree, Penland was honored for his major contributions to the advancement of hypersonic aerodynamics technology through voluntary personal commitment.

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- End -

NASA News

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For Release:

August 6, 1993

RELEASE NO. 93-064A

NASA LANGLEY AWARDS EXCEPTIONAL ENGINEERING ACHIEVEMENT MEDAL TO CHARLES MCCLINTON

NASA Langley Research Center recognized Charles R. McClinton, manager of the Numerical Applications Office in Langley's National Aero-Space Plane Program Office, with an Exceptional Engineering Achievement Medal at Langley's annual awards ceremony recently.

McClinton was honored for exceptional engineering achievement in advancing the practical application and experimental validation of computational fluid dynamics analyses for hypersonic propulsion systems.

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- End -

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For Release:

August 6, 1993

RELEASE NO. 93-064B

NASA LANGLEY AWARDS EXCEPTIONAL ENGINEERING ACHIEVEMENT MEDAL TO LEONARD WEINSTEIN

NASA Langley Research Center recognized Dr. Leonard M. Weinstein, a senior research scientist, with an Exceptional Engineering Achievement Medal at Langley's annual awards ceremony recently.

Weinstein was honored for the development of advanced high-speed fluid dynamics measurement technology. He works in Langley's Fluid Dynamics Division.

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- End -

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For Release:

August 6, 1993

RELEASE NO. 93-064C

NASA LANGLEY AWARDS EXCEPTIONAL ENGINEERING ACHIEVEMENT MEDAL TO JER-NAN JUANG

NASA Langley Research Center recognized Dr. Jer-Nan Juang, principle scientist in the Structural Dynamics Division, with an Exceptional Engineering Achievement Medal at Langley's annual awards ceremony recently.

Juang was honored for exceptional and sustained contributions to the development of system identification methods for the control of aerospace vehicles.

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For Release:

August 10, 1993

RELEASE NO. 93-065A

NASA LANGLEY AWARDS EXCEPTIONAL SCIENTIFIC ACHIEVEMENT MEDAL TO ANNE K. ST. CLAIRE

NASA Langley Research Center recognized Anne K. St. Claire with an Exceptional Scientific Achievement Medal at Langley's annual awards ceremony recently.

St. Claire was honored for exceptional contributions to the development of polymer films and coatings for aerospace use.

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August 10, 1993

RELEASE NO. 93-065B

NASA LANGLEY AWARDS EXCEPTIONAL SCIENTIFIC ACHIEVEMENT MEDAL TO PATRICK MINNIS

NASA Langley Research Center recognized Dr. Patrick Minnis with an Exceptional Scientific Achievement Medal at Langley's annual awards ceremony recently.

Minnis was honored for outstanding contributions to advancing the understanding of clouds and their effect on the Earth's radiation budget and climate.

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For Release:

August 10, 1993

RELEASE NO. 93-065C

NASA LANGLEY AWARDS EXCEPTIONAL SCIENTIFIC ACHIEVEMENT MEDAL TO LAWRENCE W. TOWNSEND

NASA Langley Research Center recognized Dr. Lawrence W. Townsend with an Exceptional Scientific Achievement Medal at Langley's annual awards ceremony recently.

Townsend was honored for outstanding contributions to the nuclear interactions of cosmic radiation with matter and its implications for space-radiation exposure and shielding.

NASA Langley Research Center, the nation's first civil aeronautical research laboratory, is located in Hampton, Va.

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For Release:

August 10, 1993

RELEASE NO. 93-065D

NASA LANGLEY AWARDS EXCEPTIONAL SCIENTIFIC ACHIEVEMENT MEDAL TO JACK FISHMAN

NASA Langley Research Center recognized Dr. Jack Fishman with an Exceptional Scientific Achievement Medal at Langley's annual awards ceremony recently.

Fishman was honored for outstanding contributions to the understanding of the photochemistry of the Earth's lower atmosphere.

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- End -

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For Release:

August 10, 1993

RELEASE NO. 93-065E

NASA LANGLEY AWARDS EXCEPTIONAL SCIENTIFIC ACHIEVEMENT MEDAL TO JOHN W. WILSON

NASA Langley Research Center recognized Dr. John W. Wilson with an Exceptional Scientific Achievement Medal at Langley's annual awards ceremony recently.

Wilson was honored for outstanding contributions to ionizing-radiation transport theory and leadership in refining this discipline.

NASA Langley Research Center, the nation's first civil aeronautical research laboratory, is located in Hampton, Va.

- End -

NASA News

National Aeronautics and
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For Release:

August 13, 1993

Release No. 93-067A

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO ROBERT A. BRUCE

NASA Langley Research Center recognized Robert A. Bruce with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Bruce received the medal for exceptional service as chief engineer of the Facilities Engineering Division in the design and development of facilities in support of Langley's aeronautics and space missions. He lives in Hampton, Va.

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-End-

NASA News

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For Release:

August 13, 1993

Release No. 93-067B

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO RAYMOND S. CALLOWAY

NASA Langley Research Center recognized Raymond S. Calloway, the Coherent Lidar Airborne Shear Sensor (CLASS) Instrument Manager in the Aircraft Instrumentation Branch, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Calloway, who lives in Hampton, Va., received the medal for outstanding achievement in flight instrumentation project management which contributed significantly to multidisciplinary advancements in aircraft technology.

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-End-

NASA News

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For Release:

August 13, 1993

Release No. 93-067C

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO ELIZABETH F. BUCHAN

NASA Langley Research Center recognized Elizabeth F. Buchan, the staff assistant to the Director for Aeronautics, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Buchan, who lives in Grafton, Va., received the medal for exceptional performance in support of the Aeronautics Directorate.

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-End-

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For Release:

August 13, 1993

Release No. 93-067D

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO PEGGY W. HARMON

NASA Langley Research Center recognized Peggy W. Harmon, an electronics technician in the Electronics Fabrication Development Section, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Harmon, who lives in Hampton, Va., received the medal for outstanding achievement in the development and evolution of computer aided design/computer aided manufacturing (CAD/CAM) technology in printed circuit board fabrication.

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-End-

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For Release:

August 13, 1993

Release No. 93-067E

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO LOIS H. BREEN

NASA Langley Research Center recognized Lois H. Breen, production controller in the Work Control Section, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Breen, who lives in York County, Va., received the medal for exceptional service associated with Langley's Computerized Facilities Preventive Maintenance Program and safety-related environmental tasks.

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-End-

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For Release:

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Release No. 93-067F

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO SANDRA S. RAY

NASA Langley Research Center recognized Sandra S. Ray, head of the Purchase and ADP Contracts Branch, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Ray received the medal for exceptional leadership and service in the acquisition of Federal information processing resources and in the development and improvement of processes in support of the research mission of Langley. Ray lives in Hampton, Va.

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For Release:

August 13, 1993

Release No. 93-067G

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO MARY MORGAN COX HUNTER

NASA Langley Research Center recognized Mary Morgan Cox Hunter, an assistant for program integration in the Facilities Program Development Office, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Hunter received the medal for exceptional service in the development and execution of the Construction Facilities Program, resulting in the required facilities and systems to support Langley's mission and goals. Hunter lives in Newport News, Va.

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For Release:

August 13, 1993

Release No. 93-067H

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO THOMAS G. POPERNACK

NASA Langley Research Center recognized Thomas G. Popernack, an aerospace technologist in the Process Systems Section, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Popernack received the medal for exceptional service in combining technical expertise and managerial skills to provide NASA with safe and reliable fluid systems and cryogenic capability in National facilities. Popernack lives in Hampton, Va.

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For Release:

August 13, 1993

Release No. 93-067I

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO ELIZABETH G. FEDORS

NASA Langley Research Center recognized Elizabeth G. Fedors, head of the Graphics Section, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Fedors, who lives in Bena, Va., received the medal for technical leadership in elevating the quality of graphics at Langley and for the creation of a digital studio.

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For Release:

August 13, 1993

Release No. 93-067J

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO JOHN J. SNOHA

NASA Langley Research Center recognized John J. Snoha, an engineering technician in Technical Support Section B, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Snoha, who lives in Hampton, Va., received the medal for contributions to the development of advanced composite materials.

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For Release:

August 13, 1993

Release No. 93-067K

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO DAVID W. PIERPONT

NASA Langley Research Center recognized David W. Pierpont, a supervisory engineering technician in the Mechanical Equipment Support Section, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Pierpont, who lives in Hampton, Va., received the medal for outstanding efforts and contributions in sustaining the reliability of the unique research facilities at Langley.

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-End-

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For Release:

August 13, 1993

Release No. 93-067L

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO MICKEY G. ROWE

NASA Langley Research Center recognized Mickey G. Rowe, assistant chief of the Analysis and Computations Division, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Rowe, who lives in Hampton, Va., received the medal for outstanding leadership in the development and management of the Central Scientific Computing Center at Langley.

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-End-

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For Release:

August 13, 1993

Release No. 93-067M

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO CHARLES A. POUPARD

NASA Langley Research Center recognized Charles A. Poupard, a supervisory engineering technician in Technical Support Section D, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Poupard, who lives in the Denbigh section of Newport News, Va., received the medal for significant contributions in support of research conducted in the 16-Foot Transonic Tunnel Complex.

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-End-

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For Release:

August 13, 1993

Release No. 93-067N

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO DR. NORMAN J. JOHNSTON

NASA Langley Research Center recognized Dr. Norman J. Johnston, manager of composites technology in the Polymeric Materials Branch, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Johnston, who lives in Newport News, Va., received the medal for outstanding contributions in advancing structural composites technology.

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-End-

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For Release:

August 13, 1993

Release No. 93-067O

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO VELMA L. CLARK

NASA Langley Research Center recognized Velma L. Clark, the Project Controls Branch secretary, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Clark, who lives in Hampton, Va., received the medal for outstanding contributions and excellence in administrative support of research and development and Construction of Facilities projects at Langley.

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-End-

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For Release:

August 13, 1993

Release No. 93-067P

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO CLARENCE E. STANFIELD

NASA Langley Research Center recognized Clarence E. Stanfield, an engineering technician in the Materials Processing and Development Branch, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Stanfield, who lives in Hampton, Va., received the medal for exceptional service in composite research and development for NASA aerospace programs.

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-End-

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For Release:

August 13, 1993

Release No. 93-067Q

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO JANICE R. WUNDER

NASA Langley Research Center recognized Janice R. Wunder, a personnel management specialist in the Placement and Positions Management Branch, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Wunder, who lives in Newport News, Va., received the medal for outstanding contributions and individual excellence in support of NASA personnel programs.

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-End-

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For Release:

August 13, 1993

Release No. 93-067R

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO JEFFREY A. PARKER

NASA Langley Research Center recognized Jeffrey A. Parker, assistant to the director for Management Operations, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Parker, who lives in Gloucester, Va., received the medal for lasting technical and management contributions to NASA.

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-End-

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For Release:

August 13, 1993

Release No. 93-067S

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO CASSANDRA G. FAVOR

NASA Langley Research Center recognized Cassandra G. Favor, an accountant in the Cost Accounting Section, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Favor, who lives in Newport News, Va., received the medal for exceptional service and professionalism as the Financial Chairman of the Combined Federal Campaign for Langley.

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-End-

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For Release:

August 13, 1993

Release No. 93-067T

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO DR. GEORGE F. HELFRICH

NASA Langley Research Center recognized Dr. George F. Helfrich, patent counsel in the Office of Chief Counsel, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Helfrich, who lives in Newport News, Va., received the medal for exceptional service and leadership in protecting NASA's intellectual property rights and in prosecution of patents covering Langley's researchers' inventions.

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-End-

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For Release:

August 13, 1993

Release No. 93-067U

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO CHARLES H. HUDGINS

NASA Langley Research Center recognized Charles H. Hudgins, an engineering technician in Technical Support Section A, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Hudgins, who lives in Mathews, Va., received the medal for exceptional service in the development of the Langley In-Situ Ozone System and support to the NASA global tropospheric experiment.

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-End-

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For Release:

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Release No. 93-067V

NASA AWARDS EXCEPTIONAL SERVICE MEDAL TO ELIJAH C. KENT

NASA Langley Research Center recognized Elijah C. Kent, an aerospace engineer in Systems Assurance Branch, with an Exceptional Service Medal at Langley's annual awards ceremony recently.

Kent, who lives in Hampton, Va., received the medal for exceptional service in defining and implementing program assurance provisions on spaceflight projects.

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-End-

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For Release:

August 13, 1993

Release No. 93-068A

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO BURT R. EMERSON JR.

NASA Langley Research Center recognized Burt R. Emerson Jr., an engineering technician in Technical Support Section B, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Emerson, who lives in Williamsburg, Va., received the medal for outstanding achievement in the design of new test methods for Langley's Advanced Aircraft Program.

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-End-

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For Release:

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Release No. 93-068B

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO VIVIAN B. MERRITT

NASA Langley Research Center recognized Vivian B. Merritt, an equal employment specialist in the Office of Equal Opportunity Programs, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Merritt, who lives in Hampton, Va., received the medal for outstanding management of Langley's Discrimination Complaints Program.

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-End-

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For Release:

August 13, 1993

Release No. 93-068C

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO CARROLL W. ROWLAND

NASA Langley Research Center recognized Carroll W. Rowland, the LITE Project Integration Manager in the Sensor Systems Branch, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Rowland, who lives in Hampton, Va., received the medal for significant contributions to the development, testing and integration of the Lidar In-space Technology Experiment (LITE).

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-End-

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Release No. 93-068D

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO PURNELL HOPSON JR.

NASA Langley Research Center recognized Purnell Hopson Jr., an electronics technician in the Microelectronics and Technical Support Section, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Hopson, who lives in Seaford, Va., received the medal for outstanding contributions in the design, development and application of direct-deposit thin-film sensor fabrication technology.

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Release No. 93-068E

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO WILLIAM L. WILLSHIRE JR.

NASA Langley Research Center recognized William L. Willshire Jr., a research engineer in the Applied Acoustics Branch, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Willshire received the medal for outstanding contributions to acoustics flight research involving the high-speed civil transport climb-to-cruise noise and the effect of atmospheric turbulence on sonic boom. Willshire lives in Poquoson, Va.

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For Release:

August 13, 1993

Release No. 93-068F

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO GARY P. STERGIN

NASA Langley Research Center recognized Gary P. Stergin, an electrical engineering technician in the Electrical Drives and Systems Operations Section, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Stergin, who lives in Newport News, Va., received the medal for outstanding contributions toward increasing the reliability of National Transonic Facility operations.

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Release No. 93-068G

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO MARK W. WYNKOOP

NASA Langley Research Center recognized Mark W. Wynkoop, an electronics technician in the Electronics Fabrication Development Section, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Wynkoop, who lives in Gloucester, Va., received the medal for outstanding achievement in the design, development, fabrication and testing of the wind shear electronic systems.

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-End-

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Release No. 93-068H

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO LAWRENCE E. PUTNAM

NASA Langley Research Center recognized Lawrence E. Putnam, head of the High-Reynolds-Number Aerodynamics Branch, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Putnam, who lives in Newport News, Va., received the medal for exceptional achievement in developing the National Transonic Facility into a viable research tool.

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Release No. 93-068I

NASA AWARDS EXCEPTIONAL ACHIEVEMENT MEDAL TO JAMES R. ROOKER

NASA Langley Research Center recognized James R. Rooker, head of the Facility Systems Branch, with an Exceptional Achievement Medal at Langley's annual awards ceremony recently.

Rooker received the medal for exceptional engineering service in resolving the 8-Foot High-Temperature Tunnel Combustor Deflagration/DDT issues that allowed timely and safe checkout of this nationally important facility. Rooker lives in Tabb, Va.

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-End-

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For Release:

August 13, 1993

Release No. 93-069

WIND SHEAR DETECTION METHOD RECEIVES R&D 100 AWARD

An improved method for airborne detection of potentially hazardous wind shears has received an R&D 100 award for one of the 100 most significant new technical products of 1993.

Dr. Roland Bowles, Rosa Oseguera and Dr. Paul A. Robinson, engineers in the Flight Systems Directorate at NASA's Langley Research Center, developed the process for in situ (at the airplane's location) measurement of wind shear using conventional aircraft sensors.

The R&D 100 award (formerly IR-100) is presented annually by *Research and Development* magazine to 100 scientists or engineers who have contributed the most significant products for advancing science and technology throughout the year. Selections are made by a panel of scientists and engineers after studying new technology around the world.

Formerly there was a method that could accurately measure wind shears while planes were climbing or descending; however, measurements taken while planes were turning were inaccurate. The new method implements three-dimensional equations of motion, rather than simplified two-dimensional equations, to perform accurate wind shear measurement during maneuvering flight. By carefully filtering out the effects of turbulence, the method is able to prevent false measurements, which have plagued other systems.

-More-

In the 24 years of NASA's participation in the R&D 100 competition, 96 NASA developments have been selected, contributing significantly to the recognition of NASA as a source of technical excellence. Langley has earned 26 of NASA's 96 awards.

The R&D 100 winners will be honored at an awards banquet at the Museum of Science and Industry in Chicago on September 9. There will be a month-long exhibit of products at the museum from August 21 through September 12 to be viewed by scientists, engineers and the general public.

-End-

NOTE: The following photograph is available to illustrate this release:
L-93-06944

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August 13, 1993

Release No. 93-070

INSTRUMENT FOR STUDYING SPACE EFFECTS WINS R&D 100 AWARD

An instrument for studying space effects on advanced aerospace materials has received an R&D 100 award for one of the 100 most significant new technical products of 1993.

The instrument, a high-tech oxygen atom generator, was developed by Dr. Ronald Outlaw, senior research scientist in the Space Systems Division at NASA's Langley Research Center, with Dr. Mark R. Davidson of Daco Technologies, Inc., Florahome, Fla.

The R&D 100 award (formerly IR-100) is presented annually by *Research and Development* magazine to 100 scientists or engineers who have contributed the most significant products for advancing science and technology throughout the year. Selections are made by a panel of scientists and engineers after studying new technology around the world.

The instrument provides a beam of pure, energetic, ground-state atoms. It is not only much smaller and less expensive than all its predecessors, but produces a higher purity of oxygen atoms. Most importantly, the small generator is ultra-high vacuum compatible, which means that it can be attached to any other ultra-high vacuum system, including systems that test, grow and analyze materials. Previously, if one wished to subject samples to such a beam, the samples had to be transported to the oxygen atom generator and tested independently. The new oxygen atom generator can be attached to any existing system and configured to its unique geometry.

-More-

Other applications include studying oxidation and developing new and exotic semi-conductor and super-conductor materials.

In the 24 years of NASA's participation in the R&D 100 competition, 96 NASA developments have been selected, contributing significantly to the recognition of NASA as a source of technical excellence. Langley has earned 26 of NASA's 96 awards.

The R&D 100 winners will be honored at an awards banquet at the Museum of Science and Industry in Chicago on September 9. There will be a month-long exhibit of products at the museum from August 21 through September 12.

-End-

NOTE: The following photographs are available to illustrate this release:
L-93-7937: Dr. Outlaw with winning generator
L-93-07019: Dr. Outlaw with forerunner to generator
Unnumbered: portrait of Mark Davidson

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release:

Marny Skora
804/864-3315

August 25, 1993

Release No. 93-082

Commercial Use of NASA Research Is Focus of Business Expo

A three-day exposition at NASA's Langley Research Center, Hampton, Va., October 19-21, will actively offer aerospace research to the private sector.

Through 175 displays, Langley's Technology Opportunities Showcase (TOPS) will highlight past successes and encourage new partnerships with American industry by inviting private firms--aerospace and non-aerospace alike--to profit from government research and innovations.

Did you know that :

- technology developed to detect microscopic flaws in aircraft and spacecraft materials is now used to assess damage to burn victims?
- a polymer film developed to coat space structures can be used to protect valuable works of art?
- a pavement finish developed to aid aircraft braking and directional control is now used on thousands of miles of U.S. highways?

And the list goes on and on. The benefits from aerospace technology are becoming more and more commonplace as NASA Langley scientists and their industry counterparts see multiple uses of aeronautics and space research.

Critical research results in the following areas will be showcased:

Aeronautics	Advanced Materials
Manufacturing Processes	Instrumentation
Nondestructive Evaluation	Measurement Technology
Structures and Dynamics	Information Sciences
Automation and Robotics	Optics and Lasers
Environmental Science	Advanced Computing
Medical	Education

(more)

Langley's senior managers, scientists, engineers and technicians will be on hand to greet attending business representatives and to present research efforts in each of the above areas.

In addition, TOPS will cover how to make the mechanics of technology transfer work by providing a road map for doing business with NASA Langley. Professionals in the areas of commercialization and patent licensing will be available as part of this process.

There is no charge for attendance, but pre-registration is required.

TOPS is designed for U.S. citizens and companies. Business representatives wishing to attend the event or those who would like additional information should contact :

Jim Raper, TOPS Project Manager
NASA Langley Research Center,
Mail Stop 480
Hampton, VA, 23681-0001
Phone (804) 864-8886 or FAX (804) 864-8885

News media wishing to cover the business expo should contact:

Marny Skora, Public Affairs Specialist
NASA Langley Research Center
Mail Stop 154
Hampton, VA, 23681-0001
Phone (804) 864-3315 or FAX (804) 864-7732

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

RELEASE NO. 93-085

For Release:

LANGLEY STORY OPPORTUNITIES -- SEPTEMBER 1993

SIMULATED SATELLITE MAY DELIVER PRECISION AIRCRAFT LANDINGS. GPS -- a state-of-the-art satellite system intended primarily for world-wide defense-related navigation -- may look even more attractive for civilian pilots if a device called a "pseudolite" proves itself in flight tests scheduled for completion this week. Researchers from NASA Langley Research Center, Hampton, Va., Allied Signal Aerospace, Balitmore, Md., Navsys, Colorado Springs, Colo., are collaborating on the project. They hope the electronic device will ultimately lead to precision GPS approaches and landings without an expensive additional navigation system. Interviews available.
ALLIED SIGNAL CONTACT: Bill Keys Ph 410-832-2390 Fax 410-583-5901
PUBLIC AFFAIRS CONTACT: Keith Henry 804-864-6124

RUSSIAN SPACE PROGRAM TOPIC OF SEPT. 20 TALK. Langley's next Colloquium features Professor Roald Sagdeev, one of the world's leading physicists renowned for his work on non-linear space plasmas, speaking on the "Russian Space Program--The Past Accomplishments Vs. Uncertain Future." Sagdeev was a key science adviser to President Gorbachev and Director of Moscow's Institute for Space Research for 10 years. The Colloquium begins at 2 p.m. A press briefing is scheduled at 1:15 p.m. Both events will be at the H.J.E. Reid Conference Center, 14 Langley Blvd.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

'NASA SUCCESS STORY' AVAILABLE. Listed under "NASA's Successes," Langley's 75th Anniversary publication, Winds of Change, is offered for sale in the current Government Printing Office catalog. Call 202-783-3238 between 8-4 EST to order.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

UNIQUE DIAMOND WING TESTED. The Boeing candidate for a future U.S. Navy early warning aircraft under test in Langley's 16 Foot Transonic Tunnel. The unusual joined wing design forms a diamond shape as viewed from above. The concept boasts enhanced detection of small, low-observable targets. Photos available.
BOEING MILITARY AIRPLANES CONTACT: Peri Widener (206) 655-8632
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

- more -

LANGLEY TAKES 2 R&D 100 AWARDS. Among the 100 most significant products for advancing science and technology in the previous year as judged by Research and Development Magazine:

o *A HIGH-TECH OXYGEN ATOM GENERATOR*, an instrument for studying space effects on aerospace materials. Importance: Among other things, the small oxygen atom generator is compatible with ultra-high vacuum systems that test, grow and analyze materials, greatly increasing ease and efficiency of testing. Developed in cooperation with Daco Technologies, Inc., Florahome, Fla.

o *A WINDSHEAR DETECTION METHOD,* mathematical equations for improved airborne detection of potentially hazardous wind shears. Importance: Added protection for commercial aircraft as they operate at low altitudes in thunderstorms with rapidly changing wind directions.

PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

WINDSHEAR FINDINGS TO BE PRESENTED. A NASA- and FAA-sponsored meeting Sept. 28-30 in Hampton, Va., will provide a forum for transfer of information to U.S. industry from the NASA/FAA Airborne Wind Shear Sensors Program. Tremendous advancements in areas of product development and certification have occurred since a similar meeting was held last year. Future sensor technology applications, in addition to wind shear detection, will be discussed.

PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

COMING IN OCTOBER:

BUSINESS EXPO ENCOURAGES COMMERICAL USE OF NASA RESEARCH. An agressive program inviting private industry to profit from government research is the focus of a three-day exposition at NASA Langley Oct. 19-21. Through 175 displays, Langley's Technology Opportunities Showcase (TOPS) will highlight past successes and encourage new partnerships with aerospace and non-aerospace industries.

TOPS PROJECT MANAGER: Jim Raper (804) 864-8880

PUBLIC AFFAIRS CONTACT: Marny Skora (804) 864-3315

- End -

NASA News

National Aeronautics and
Space Administration

Langley Research Center
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For Release:

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Headquarters, Washington, D.C.
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September 23, 1993

H. Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6120/4)

John McAnulty
Wilcox Electric
(Phone: 816/474-9407)

RELEASE: 93-090

Flight Tests Prove Simpler Satellite-Guided Autoland Method

Flight tests with a NASA research aircraft last week demonstrated the first precision, automatic approaches and landings using Differential Global Positioning System (DGPS) navigation satellite signals without relying on complex processing techniques.

Wilcox Electric, Kansas City, Mo., and NASA's Langley Research Center, Hampton, Va., performed the tests using DGPS and a simple "code tracking" signal-processing technique. The aircraft position accuracies achieved appear to satisfy tough Federal Aviation Administration (FAA) requirements for landings in low-visibility conditions, called "Category IIIB."

"We've picked up where other recent flight tests have left off," said Wayne Dohlman, Wilcox Electric's business development director. "This is the first time a DGPS autoland has been achieved without the use of special equipment or processing techniques such as pseudolites or carrier phase tracking."

Seventeen "hands off" approaches and landings were completed on Sept. 15 using Wilcox DGPS avionics installed in NASA's Boeing 737 research

- more -

aircraft. The flight tests at NASA's Wallops Flight Facility, Wallops Island, Va., were conducted under an agreement to test new flight technologies.

Ground instrument data to confirm that the tests achieved Category IIIB accuracies will be analyzed next month, but observations based on flight performance look encouraging.

"The system performed exceptionally well and consistently, especially for a first flight test. I'm looking forward to analyzing the data," said Richard M. Hueschen, NASA flight test project engineer.

The aircraft guidance information was unaided by the flight management system or other avionics. The landings used raw, differential GPS guidance supplied to the autopilot in the Boeing 737. A laser tracker, placed at a known geographical reference point near the runways, served as an independent reference system for aircraft-based measurements.

The code tracking technique used for the tests is a simpler way to determine aircraft position that is expected to lead to more economical DGPS ground systems and avionics. That could make satellite guidance of precision approaches and landings practical for commercial aircraft.

The aviation industry now is doing tests with the Global Positioning System to see if the satellite technology is feasible for widespread private and commercial airline use in precision approach landings. The technology could provide an inexpensive, worldwide, all-weather landing system. Differential techniques are used to augment or correct raw signals beamed through space from the GPS satellites.

FAA is evaluating DGPS readiness for precision approach and landing. FAA and other international civil aviation authorities will meet in 1995 to examine the results of these evaluations and agree on a worldwide policy for the use of DGPS for navigation and landing.

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NASA News

National Aeronautics and
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Langley Research Center
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For Release:

September 28, 1993

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(Phone: 202/267-3447)

RELEASE: 93-091

NEW WINDSHEAR SENSORS A GOVERNMENT-INDUSTRY SUCCESS STORY

Representatives from NASA, the Federal Aviation Administration (FAA) and industry today told how they worked together to take windshear advance-warning devices from the drawing board to the commercial aviation marketplace in just 5 years.

"A few years ago, almost nobody thought these sensors would work. Now, companies are putting ads in trade magazines saying, 'Call this 800 number for information on our product'," said Herbert Schlickenmaier, program manager at NASA Headquarters. "It's a true government-industry success story."

"The results of this cooperative effort between the FAA, NASA and industry demonstrate what can be achieved when government agencies work together and with industry to increase safety for the traveling public," said George C. "Cliff" Hay, FAA airborne windshear program manager. "At this time the Certification Office is processing several windshear detection devices for industry and approval is expected within weeks. Many firm orders for production equipment have been placed."

The windshear reports, part of a NASA/FAA conference in Hampton, Va., detailed development of microwave radar, laser radar and infrared sensors that provide up to 40 seconds warning of windshear-- sudden, violent changes in wind speed and direction that can endanger aircraft. NASA/FAA studies have shown that pilots can avoid or fly through windshear safely if they have enough warning that the hazard exists ahead of their aircraft.

- more -

Windshear was a factor in air accidents that caused at least 500 deaths from 1964 to 1985. In 1986, NASA and the FAA began a joint windshear research program that included studies of the hazard itself and flight tests of the advance-warning sensors.

In 1988, the FAA ruled that airlines had to install reactive windshear instruments, which alert pilots only after they encounter the hazard, in their planes by the end of 1993. But four airlines--Continental, Northwest, American and now-defunct Eastern--asked for and got waivers until 1995 so that they could examine NASA's work on advance-warning sensors.

"The FAA decision really transformed NASA's windshear program," said Schlickenmaier. "Now there would be real airplanes that real companies would want to plug NASA technology into." NASA's Langley Research Center in Hampton focused on detecting windshear with Doppler microwave radar, which is much like the radar that shows images of storms on TV weather reports. NASA personnel developed signal-processing mathematical formulas and built hardware used in the windshear research.

Langley worked closely with several aviation electronics firms that wanted to develop and market commercial versions of radar windshear sensors: Rockwell International's Collins Air Transport Division, Cedar Rapids, Iowa; Westinghouse Electric Corp., Baltimore; and Bendix Corp., now part of Allied-Signal Aerospace Company, Ft. Lauderdale, Fla.

NASA gave private companies information about the windshear hazard and NASA's work on forward-looking windshear radar technology. In turn, firms shared the results of their research. The arrangement greatly accelerated the transfer of technology from the NASA/FAA program to industry.

In a related effort, NASA contracted with Lockheed Missiles and Space Co., Sunnyvale, Calif., to develop a laser radar, or LIDAR. LIDAR finds windshear by reflecting laser beams off tiny particles moving in a storm. It works better in dry conditions than in heavy rain.

A third windshear sensor, a passive infrared device that picks up temperature differences inside a microburst, was produced by Turbulence Prediction Systems, Boulder, Colo. The work was part of NASA's Small Business Innovation Research (SBIR) program, which teams small companies with the government to do research.

NASA's Boeing 737 successfully tested the microwave radar and infrared sensor by flying toward -- and often into -- microbursts around the Orlando, Fla., area in 1991. The LIDAR was added for further tests in Orlando and Denver in 1992. Research aircraft from Rockwell International, Westinghouse and Allied-Signal performed similar tests to evaluate each firm's own Doppler radar systems.

Although not formally part of the NASA/FAA windshear program, Continental Airlines, Houston, has equipped three of its airliners with microwave radar, infrared and reactive windshear sensors to get engineering data under real operating conditions. The company will use the information to decide what systems to put in its aircraft.

- end -

NASA News

National Aeronautics and
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For Release:
September 29, 1993

RELEASE: 93-092

NASA, FAA Consider Revised Windshear Piloting Procedures

NASA and the Federal Aviation Administration (FAA) are considering whether pilots should have formal training to interact with new aircraft instruments able to give advance warning of windshear -- sudden changes in wind speed and direction that can endanger aircraft during takeoff and landing.

Training consideration comes after 7 years of windshear studies by NASA and the FAA. The joint effort included research on windshear hazards, flight tests of three new advance-warning sensors and studies of pilot response to displays generated by data from the devices. The recommendations were reported at a NASA/FAA windshear meeting in Hampton, Va.

"Forward-looking windshear sensors could be available to airlines by the end of this year," said Rosa Oseguera of NASA's Langley Research Center, Hampton, Va. "We believe the most effective use of the sensors requires an industry standard on displays, a consensus on proper crew procedures for reacting to the information and training to put those procedures into effect."

Windshear was a factor in air accidents that caused at least 500 deaths from 1964 to 1985. In 1987, the FAA created training aids to help pilots identify the phenomenon and escape if they unexpectedly enter a windshear.

- more -

Oseguera and NASA engineer David Hinton outlined NASA's suggested displays and pilot actions for use by the FAA, aircraft manufacturers and air carriers. Because the new sensors can give up to 40 seconds warning of a windshear encounter, the procedures consider how far away the windshear is and where it is in relation to the plane's flight path.

If the displays show a windshear more than 3 miles away or to the side of the flight path during the approach to the runway, for example, pilots would normally fly around the threat. If a windshear is on the flight path within 3 miles, pilots would either execute "missed approach" procedures or fly around it after clearance from air traffic controllers.

A warning of windshear less than 1.5 miles ahead would dictate a straight-ahead escape, since there might not be enough time to contact controllers, get clearance and turn away from the hazard. The new sensors make this procedure possible because transport aircraft normally have power to fly through windshear if the pilots know about the hazard in advance and take appropriate actions.

Similar rules would apply to windshear spotted during takeoff, but the distance guidelines are somewhat different.

"Training based on use of the new sensors would let pilots evade windshears when possible, but also would make sure they can fly through them safely if contact can't be avoided," said Herbert Schlickenmaier, Program Manager at NASA Headquarters, Washington, D.C. "These procedures would expand on, not replace, current FAA-mandated techniques for avoiding windshear."

NASA and the FAA began the joint windshear research program in 1986 to reduce the hazard to transport-type aircraft during takeoff and approach. A NASA Boeing 737 successfully flight-tested three types of forward-looking sensors in 1991 and 1992: microwave radar, Doppler LIDAR (laser radar) and infrared.

"There are a number of tools available to reduce the hazard from the windshear threat. The ability to detect, locate and quantify this threat and relate it to aircraft performance capability, which these latest devices provide, is a tribute to all the participants in this program," said George C. "Cliff" Hay, FAA airborne windshear program manager.

These instruments are "predictive" sensors, in contrast to "reactive" sensors that alert pilots only after a plane enters a windshear. FAA regulations say that reactive systems must be installed by most U.S. airlines by the end of 1993. Continental, Northwest and American Airlines asked for and got exemptions that would let them put predictive sensors in their aircraft by 1995.

- end -

NASA News

National Aeronautics and
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For Release:
September 30, 1993

RELEASE: 93-093

NASA/FAA RESEARCH AIMS AT MORE EFFICIENT AIRSPACE OPERATIONS

NASA and the Federal Aviation Administration (FAA) today described innovative new aeronautics research programs that will let airports across the nation and around the world handle more planes with fewer delays while maintaining today's high level of safety.

"Delays not only inconvenience travelers, but also cost U.S. airlines hundreds of millions of dollars annually," said Herbert Schlickenmaier, Program Manager at NASA Headquarters, Washington, D.C. "We want to solve that problem with affordable, human-centered automated tools in the cockpit and on the ground."

A key NASA/FAA research effort called the Terminal Area Productivity program is studying how to achieve aircraft separation distances in low-visibility conditions similar to those allowed under visual flight rules for both single and multiple runway operations. This would let airports handle the same number of flights in almost any weather.

Researchers first need to understand today's safety levels to assess new technologies and come up with new procedures and modified separation criteria. NASA and the FAA are using today's operations as a benchmark. They will then create new standards that reduce separation distances while assuring safety.

- more -

The results will be tested in 1995 based on studies of wake vortex phenomena -- swirling air currents that stream from an aircraft's wingtips and cause turbulence for following planes. Current FAA rules for pilots and air traffic controllers specify vortex separation distances based on aircraft type, weather and visibility.

NASA researchers believe new technology for ground-based sensing of weather conditions can reliably predict when wake vortex separations can be reduced safely. These forecasts will be incorporated into the NASA/FAA Center/TRACON Automation System, a set of computerized tools that helps controllers orchestrate aircraft arrivals.

If the effort succeeds, controllers also would have at least 20 minutes notice that a combination of weather conditions and aircraft types may create a wake vortex hazard.

NASA also is researching advanced instruments and cockpit displays that would let airline pilots fly and land safely in very-low-visibility conditions. This would greatly increase the number of flights in poor weather, decrease delays and help airlines cut operating costs.

A computer would fuse data from infrared sensors, radar and cameras into realistic electronic cockpit displays on which pilots could "see" the runway and other airplanes through fog, rain and snow. The image probably would appear with helpful superimposed symbols in a "heads-up display" -- a glass screen that also lets pilots see though the front windows.

NASA researchers believe that this "enhanced vision" technology could be ready for service in commercial airliners before the year 2000.

The Terminal Area Productivity and enhanced vision research plans were outlined at a joint NASA/FAA windshear conference in Hampton, Va.

- end -

NASA News

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For Release:

October 4, 1993

RELEASE NO. 93-096

Health Care is Topic of NASA's October Colloquium

NASA Langley's October 12 colloquium features Frank Nichols, M.D., a thoracic and vascular surgeon at the nation's largest non-metropolitan hospital, speaking on "Health Care: Science, Economics, Ethics, and People."

The cost of health care as a percentage of the national budget has reached crisis proportions. The conflicting pressures of expectations and cost control are affecting science, research, development and applications, according to Dr. Nichols.

"Science in general and medicine in particular are faced with decisions of priority," Nichols says, "and scientists and politicans must develop and act upon ethical criteria, considering the needs of individuals and funds to maximize benefits, while protecting the disadvantaged."

He received his B.S. degree from the University of Wyoming in 1964 and came to Langley Research Center to consider becoming a medical astronaut. Vision restrictions prevented that option, so he went on to medical school at the University of Chicago. Following medical school (1968), he specialized in cardio-vascular thoracic surgery at the University of Rochester and Strong Memorial Hospital in Rochester, N.Y., through 1975.

Dr. Nichols then joined the staff at the Northern Mississippi Medical Center, Tupelo, Miss., where he is currently active in many hospital committees and advisory groups. In 1983 he founded the North Mississippi Vascular Center.

The colloquium begins at 2 p.m. A press briefing is scheduled for 1:15 p.m. Both events will be at NASA's H.J.E. Reid Conference Center, 14 Langley Blvd.

Dr. Nichols will present the same lecture at 7:30 p.m. October 12 at the Virginia Air and Space Center's IMAX theatre as part of the Sigma Series. The Sigma Series is a series of free public lectures sponsored by the Virginia Air and Space Center, the Daily Press and NASA.

-End-

NASA News

National Aeronautics and
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October 7, 1993

Release No. 93-097

Mission Fulfills Last Leg of Orbital Environment Tests

When Space Shuttle Columbia (STS-58) lifts off October 14 at approximately 10:53 a.m. EST, her payload will include a NASA Langley experiment to characterize orbital environments, impacting both the operation of Space Station and the interpretation of microgravity experiments.

The Orbital Acceleration Research Experiment (OARE), conceived by Robert Blanchard of NASA's Langley Research Center, Hampton, Va., essentially measures the Shuttle's aerodynamic forces (drag) in orbit and during the early stages of reentry. These measurements will be used by researchers at NASA Langley and around the country to establish models predicting orbital aerodynamic behavior, said Blanchard of the Space Systems Division's Aerothermodynamics Branch.

"Our purpose is to measure forces under conditions that are not easily generated in the wind tunnels," Blanchard said. "Drag is difficult to measure here on the ground, particularly for orbital environments that exhibit high speeds and low densities."

Researchers working on Space Station have shown a keen interest in the experiment. Although orbital drag forces are miniscule, they are capable of bringing a shuttle, Spacelab, or Space Station out of orbit given enough time. Additionally, members of the microgravity community plan to use the data to aid the interpretation of microgravity experiments, such as crystal growth.

OARE is one component of the comprehensive Orbiter Experiment (OEX) program, which was instituted in the 1970s to predict orbiter behavior

throughout a variety of orbital conditions and speeds. With STS-58, OARE will have completed its OEX objectives.

STS-58 will be dedicated to life sciences research. Columbia's crew will perform a series of experiments to gain more knowledge on how the human body adapts to the weightless environment of space. Experiments will focus on cardiovascular, regulatory, neurovestibular and musculoskeletal systems of the body. The experiments performed on Columbia's crew and on laboratory animals, along with data collected on the SLS-1 mission in June 1991, will provide the most detailed and interrelated physiological measurements acquired in the space environment since the Skylab program in 1973 and 1974.

The mission is planned to last 14 days, with a landing at Edwards Air Force Base in California. Commander for the flight is John Blaha, Col., USAF. Rick Searfoss, Lt. Col., USAF, is the pilot. Mission specialists are Rhea Seddon, M.D.; Bill MacArthur, Lt. Col., USA; David Wolf, M.D.; and Shannon Lucid, PhD. The payload specialist for STS-58 is Martin Fettman, D.V.M, PhD.

-end-

NASA News

National Aeronautics and
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Langley Research Center
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RELEASE NO. 93-098

For Release:

LANGLEY STORY OPPORTUNITIES -- OCTOBER 1993

PHOTO OPPORTUNITY SERIES:
ONE-OF-A-KIND AIRCRAFT PREPARED FOR FLIGHT TESTS. The NASA F-16XL aircraft is being modified for the first phase of a multi-year flight research program in support of the High Speed Civil Transport program. The Naval Aviation Depot (NADEP), Norfolk, has painted the aircraft's wings and fuselage with a special NASA scheme that provides high contrast essential to aerodynamic flow visualization studies. A series of photo opportunities is offered, from a scheduled Oct. 4 rollout at NADEP to departure from NADEP a day or two later, to arrival at NASA Langley on the same day. Please call for departure or arrival arrangements.
NADEP PUBLIC AFFAIRS CONTACT: Robin Willis (804) 444-8242
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

OZONE-MAPPING SATELLITE RESULTS HIGHLIGHTED. An international science team will meet at Langley Research Center Oct. 6-8 to review findings from the Halogen Occultation Experiment (HALOE), which has spent 2 years on orbit aboard the UARS (Upper Atmosphere Research Satellite). HALOE, fabricated and tested at Langley, has revealed several new insights into the Earth's ozone layer. HALOE is currently making observations over Antarctica in its third year of operations. Interviews and materials.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

'HEALTH CARE: SCIENCE, ECONOMICS, ETHICS AND PEOPLE.' Langley's Oct. 12 Colloquium will feature Dr. Frank A. Nichols, a surgeon at North Mississippi Medical Center, on the subject of "Health Care: Science, Economics, Ethics and People." The presentation begins at 2 p.m. at the H.J.E. Reid Conference Center, 14 Langley Blvd.
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LANGLEY EXPERIMENT FLIES ON SHUTTLE COLUMBIA. STS-58, scheduled for an Oct. 14 launch, provides Langley researchers the opportunity to measure the extremely low acceleration environment of the Shuttle on-orbit. The instrument will calibrate itself on-orbit so that absolute values of these accelerations can be measured. Maneuvers will also be performed to verify on-orbit calibrations. The OARE -- Orbital Acceleration Research Experiment -- also flew on STS-40 and on STS-50, and is

- more -

expected to confirm results from previous flights. This mission will complete a decade of flight tests in the Orbiter Experiment Program. Interviews, graphics available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

TECHNOLOGY TRANSFER IS THEME OF FIRST BUSINESS EXPO. Langley's Technology Opportunities Showcase (TOPS), a three-day business expo that outlines how industry can profit from government research, is slated for October 19-21. TOPS will feature 180 exhibits of Langley Research Center technology -- innovations available for licensing and commercialization and selected past technology transfer successes. A goal of the program is to bolster the U.S. economy by helping aerospace and non-aerospace firms understand how to do business with NASA Langley. Materials available.
PUBLIC AFFAIRS CONTACT: Marny Skora (804) 864-3315

AN ELECTRIFYING NASA-INDUSTRY SUCCESS STORY. New lightning-protection technology has been developed for small fiberglass aircraft. This technology grew out of NASA's Small Business Innovative Research (SBIR) program and resulted in the Glasair III LP -- produced by Stoddard-Hamilton Aircraft, Inc., Arlington, Wash. It is the latest in a family of high-technology, high-performance aircraft sold as kits. The factory-built prototype was used to validate fabrication and protection techniques developed jointly with several other small businesses: Lightning Technologies, Inc., Pittsfield, Mass.; Analytical Services & Materials, Hampton, Va.; and Aero-Space Consultants, Newport News, Va. The first customer will take delivery of a Glasair III LP (Lightning Protected) kit in a few weeks. Interviews, fact sheet, photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

VIRGINIA ARCHAEOLOGY MONTH -- 350-YEAR OLD FARMSITE DISCOVERED. An opportunity to study life on a 17th and 18th century Southeastern Virginia farm has been discovered in the form of over 8,000 artifacts, recently unearthed at the NASA Langley Research Center. The two-acre farmsite was part of a 50-acre farm that existed for over 125 years and belonged to the Francis Ross family of Elizabeth City County. The discovery has the potential to answer pertinent questions about settlement patterns in 17th century Tidewater Virginia. October is, coincidently, Virginia Archaeology Month. Photos, interview available.
PUBLIC AFFAIRS CONTACT: Kristina Murden 804-864-8150

MATERIALS WITH A BRAIN. Researchers at NASA Langley and Clemson University, S.C., have developed a new processing technique for producing "smart" materials that could result in acoustically quiet aircraft structures, solid state compressors for refrigeration systems and miniature pumps for the medical industry. This technique is the first to ever make use of an internal bias in the material. "Smart" materials can detect changes in the environment and make adjustments. For instance, some cars' suspension systems adjust for bumpy road conditions automatically, giving the passengers a smoother ride. Interviews and materials available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- End -

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release:

Marny Skora
(804) 864-3315 (days)
(804) 868-6245 (evenings)

Release No. 93-100 October 6, 1993

NOTE TO EDITORS: NASA Langley Presents Technology Expo

News media are invited to cover a three-day business event designed to link government research with private industry initiatives in a continuing effort to keep America commercially competitive.

NASA's Langley Research Center, Hampton, Va., will host an aggressive program October 19, 20 and 21, inviting aerospace and non-aerospace business firms to profit from research and innovations developed at one of the country's premier federal labs.

This event reflects Langley's commitment to aggressively promote government-industry partnerships. NASA Administrator Daniel S. Goldin has been instrumental in leading the initiative to broaden the Agency's customer focus. Goldin will open the expo with keynote remarks at a brief ceremony on Tuesday, October 19, at 9:30 a.m. Goldin and Langley Director Paul F. Holloway will be available for interviews following this opening ceremony.

Through 180 interactive displays including hardware, video and aircraft technology testbeds, Langley's Technology Opportunities Showcase (TOPS) will encourage new partnerships with American industry and highlight past technology transfer successes. The exhibit areas will be staffed by Center discipline experts and will be open from 8 a.m. to 4:30 p.m. each day. Critical research developments and current investigations in the following areas will be showcased all three days:

Aeronautics	Advanced Materials
Manufacturing Processes	Instrumentation
Nondestructive Evaluation	Measurement Technology
Structures and Dynamics	Information Sciences
Automation and Robotics	Optics and Lasers
Environmental Science	Advanced Computing
Medical Advances	Education

There is no charge for attendance, but pre-registration is encouraged.
Please contact Marny Skora at (804) 864-3315 or by FAX (804) 864-7732.

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

RELEASE NO. 93-101

For Release:
IMMEDIATE

WHO:	NASA Langley Research Center
WHAT:	Technology Opportunities Showcase (TOPS)
WHEN:	October 19, 20, 21, 1993
WHERE:	Hampton, Virginia
WHY:	To help businesses use NASA technology to make them more competitive in the world marketplace.

SPECIAL 'TOPS' LANGLEY STORY OPPORTUNITIES

MEDICAL:

TECHNOLOGY FLOWS FROM WIND TUNNEL TO WINDPIPE. Aerodynamic test techniques, developed by NASA for aerospace research, have been adapted by the Eastern Virginia Medical School and NASA Langley for an improved method of diagnosing and monitoring potentially fatal obstructions in human throats and windpipes. Nonintrustive instruments taped to the outside of a patient's throat can determine the location of an obstruction and the area of windpipe remaining open. This technique replaces observation by fiberoptics placed in the throat which can be frightening to young patients or irritate an already inflamed throat.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

ENVIRONMENT:

WATER WINGS MIX IT UP FOR MARINE LIFE. What NASA is learning about potenially hazardous air flow behind an airplane wing is being used to create life-giving water flow in the Chesapeake Bay. During hot weather, water in the bay forms layers, inhibiting the vertical mixing of oxygen from water near the surface and often causes death to marine life near the bottom. To help solve this problem, the College of William & Mary's Virginia Institute of Marine Science and NASA Langley developed the "water wing" -- a buoyant wing, moored to the bay bottom, that uses the natural aerodynamic forces of a wing to provide transport and mixing of oxygen. Photos, video available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

- more -

SAFETY:

WINDSHEAR TEAM WORKS TO GIVE PILOTS PRECIOUS EXTRA SECONDS. NASA, the FAA and industry have worked together to take windshear advance-warning devices from the drawing board to the commercial aviation marketplace in just 5 years. FAA certification is expected within weeks for several windshear detection devices ready for market. Many firm orders for production equipment have been placed. Windshear was a factor in air accidents that caused at least 500 deaths from 1964 to 1985. Shortly thereafter, NASA and the FAA began a joint windshear research program that included studies of the hazard itself and flight tests of the advance-warning sensors. The sensors provide up to 40 seconds warning of windshear -- sudden, violent changes in wind speed and direction that can endanger aircraft -- enough time to avoid or safely fly through the hazard. Photos, video, materials available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

ENERGY:

NASA CLIMATE RESEARCH PROMISES TO BENEFIT SOLAR ENERGY APPLICATIONS. Before the end of this decade, NASA Langley atmospheric scientists expect satellite techniques they recently developed to greatly simplify solar radiation modeling for prospective solar equipment sites. Dependable, high-resolution information about surface radiation is needed to design and develop solar-powered systems which operate efficiently. A series of new satellites to be launched in the next few years will improve resolutions from space-based measurements. Together, these advances -- new satellite techniques and higher-resolution satellite instruments -- promise to do away with difficult modeling techniques now required to correct data gathered from sparsely distributed ground sites. Graphics available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

SAFETY:

NOW EVEN SMALL PLANES CAN BE LIGHTNING-PROTECTED. The first customer deliveries of fiberglass kit planes that make use of new lightning-protection technology are expected within a few weeks. This technology grew out of NASA's Small Business Innovative Research (SBIR) program and resulted in the Glasair III LP -- produced by Stoddard-Hamilton Aircraft, Inc., Arlington, Wash. It is the latest in a family of high-technology, high-performance aircraft sold as kits. The factory-built prototype was used to validate fabrication and protection techniques developed jointly with several other small businesses: Lightning Technologies, Inc., Pittsfield, Mass.; Analytical Services & Materials, Hampton, Va.; and Aero-Space Consultants, Newport News, Va. Interviews, fact sheet, photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

MEDICAL:

BURN-DEPTH TECHNOLOGY RESULTS IN COMMERCIAL PRODUCT. Supra Medical Systems is successfully marketing a device that detects the depth of burn wounds in human skin. To develop the product, the company used technology developed by NASA Langley physicists looking for better ultrasonic detection of small air bubbles and cracks in metals. The device is being marketed to burn wound analysis and treatment centers. Through a Space Act agreement, NASA and the company are also working to further develop ultrasonic instruments for new medical applications.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

COMPUTER:

SOFTWARE TOOL AIDS IN EARLY DESIGN DECISIONS. Before the design process can begin -- whether it be for a product or for a better way of doing business -- managers must visualize design process elements and how they interact in order to plan for the most efficient approach. DeMAID, for Design Manager's Aid for Intelligent Decomposition, is a computer software aid for doing just that. Displayed on a computer monitor in an easy-to-read matrix format, it allows the design manager to see the interactions among the processes, reorder them as needed and determine which processes can be performed in parallel. For instance, DeMAID is excellent for designing an efficient information flow through an organization. Photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

ENGINEERING:

COMPUTER-GENERATED FLUID FLOWS ARE NOT JUST FOR AIRPLANES. Supercomputers have made it possible -- with methods developed by NASA Langley computer scientists -- to perform accurate simulations of the airflow around an entire airplane. The basic methodology, including analysis and design capability, is applicable to general fluid flows and can be applied to non-aerospace uses such as automobiles, submarines, fan cooling, pipe flows and building designs. Photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

SAFETY:

NEW TECHNOLOGY TO DETECT AGING AIRCRAFT FLAWS READY FOR COMMERCIALIZATION. A safe, cost-effective method for certifying that aircraft -- especially older aircraft -- are structurally safe to fly has been developed in NASA Langley's nondestructive evaluation (NDE) labs. Called thermal bond inspection, the technique uses heat and an infrared camera to detect disbonding and corrosion under the aircraft skin. Current inspection techniques require disassembly and removal of aircraft skin. A compact, transportable, field-ready system has been developed and demonstrated on a number of commercial aircraft. Photo and graphic available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

MATERIALS:

LIGHTEST ENGINES MAY SPORT PISTONS OF TOUGH NEW COMPOSITE MATERIAL. Pistons made of a tough, heat-resistant material developed for aerospace applications may prove to be the perfect replacement for aluminum pistons in sport and utility applications from jet skiis to lawnmowers. Among its advantages, carbon-carbon composite material has greater strength and stiffness than aluminum and maintains these properties at temperatures at over 2,500 degrees Fahrenheit. NASA Langley researchers believe that an engine using carbon-carbon pistons could operate at higher temperatures without piston failure, be more reliable at high power levels, use leaner fuel-air mixtures for higher fuel economy, lower hydrocarbon emissions and be designed with a lower reciprocating mass.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

- End -

NASA News

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For Release:

October 28, 1993

RELEASE NO. 93-104

November Colloquium Features "Home-style" Physics

NASA Langley's November 8 colloquium features Drs. D. Rae Carpenter, Jr. and Richard B. Minnix in "Some Interesting Demonstrations of Physical Phenomena," a potpourri of demonstrations designed to appeal to engineers and applied scientists.

These inexpensive, simple-to-construct demonstrations include learning how to stand on an egg without breaking it, how to "bounce" eggs, and how to create giant smoke rings. The progran is both entertaining and educational.

Dr. Carpenter received his B.S. degree in physics and mathematics from Roanoke College, his M.S. in experimental physics and applied math at Cornell University and his PhD in experimental physics from the University of Virginia. He is currently the acting director for the Virginia Military Institute's Research Laboratories. Dr. Minnix received his B.S. from Roanoke College and his M.S. from the University of Virginia in physics and his PhD from the University of North Carolina at Chapel Hill in experimental physics. He is currently the head of the physics and astronomy department at the Virginia Military Institute.

Individually and collectively, they give presentations to 4,000 people a year, ranging from kindergartens to retirement homes and from civic clubs to graduate seminars, and they conduct summer workshops for teachers. Drs. Carpenter and Minnix recently published a resource for teachers entitled "The Dick and Rae Physics Demo Notebook."

The colloquium begins at 2 p.m. A press briefing is scheduled for 1:15 p.m. Both events will be at NASA's H.J.E. Reid Conference Center, 14 Langley Blvd.

A similar lecture--geared to high school and college students--begins at 7:30 p.m. November 8 at the Virginia Air and Space Center's IMAX theatre as part of the Sigma Series. Audience participation will be encouraged as students learn, for example, how to make a straw trombone and how to sit on a "seat" of nails. The Sigma Series is a series of free public lectures sponsored by the Virginia Air and Space Center, the Daily Press and NASA.

-End-

NASA News

National Aeronautics and
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For Release:
October 25, 1993

RELEASE: 93-105

Cockpit Weather System may Save Airlines $6 Million per Year

Tests of a new NASA-developed, in-flight weather information system show that it could help airlines save nearly $6 million per year.

The Cockpit Weather Information Needs (CWIN) system draws on several commercial data sources to create radar maps of storms and lightning and reports of surface observations. In NASA simulations from March to July, pilots on 14 flight crews burned less fuel and flew fewer miles in avoiding bad weather using CWIN displays.

"We believe the fuel, distance and time savings from a system like CWIN would cut a typical airline's operating costs by $5.9 million annually," said Charles H. Scanlon, who developed the system at NASA's Langley Research Center, Hampton, Va. "Planes have to fly around storm hazards about once every 13 flights, so it's a real issue."

Pilots have problems getting and evaluating timely weather information. Onboard radar cannot "see" more than 150 miles out or through large thunderstorms. Pilots do receive weather data from air traffic controllers by voice or through digital transmissions, but the pilots still must figure out the true size of storm cells and theirrelation to the plane's flight path.

In contrast, CWIN provides computer graphics that show the position of storms and lightning on maps that also contain the aircraft's actual flight path and possible alternate routes. A green-yellow-red color coding system shows the intensity of the radar echoes. Lightning reports appear as yellow dots. Pilots interact with CWIN via a touch-sensitive screen.

- more -

From March 29 to July 8, 1993, flight crews from America West, Northwest, United, USAir, Boeing and Honeywell tested CWIN at Langley. Each crew made two simulated flights from Denver to Reno, Nev., and two from Denver to St. Louis. CWIN was used on half the missions.

The pilots used 5 percent less fuel and flew 5 percent fewer miles detouring aroundadverse weather on the flights where CWIN was available. Almost all said theirability to monitor
weather along the route was "much better" than current systems. Eighteen of the 26 pilots gave CWIN a "much better" safety level in bad weather operations.

The pilots especially liked CWIN's ability to display historical data. The system replays the five most recent maps of storms, lightning and surface observations when a button on the screen is touched. This feature lets pilots make better decisions about alternate routes based on how bad weather is developing or dissipating.

Weather data for the CWIN evaluations were pulled from several sources. Radar summaries came from WSI, Inc., Billerica, Mass. Lightning data came from GDS, Inc., Tucson, Ariz. Alden Weather, Westborough, Mass., supplied surface observations and airport forecasts. Text for the weather data was drawn from CompuServe, Columbus, Ohio.

CWIN technology already is being adapted for the General Aviation market. ARNAV Systems, Inc., Puyallup, Wash., and PanAm Weather Services, Minneapolis, are marketing a cockpit weather system called RWxLinkS that uses several CWIN features, including lightning graphics and ground-based radar summaries.

WxLink sends weather data to an aircraft and accepts automatic pilot reports of weather conditions. The pilot reports then are sent via satellite into the National Weather System, where other weather users can access them. WxLink uses a network of ground transceivers owned by PanAm and aviation electronics sold by ARNAV. The companies first are marketing the system to owners of small aircraft.

The Critical Technologies Division of NASA's Office of Aeronautics, Headquarters, Washington, D.C., managed development of the Cockpit Weather Information Needs system. Dr. James Jenkins is the Program Manager.

-end-

NOTE TO EDITORS: Photos showing several CWIN displays are available to media representatives by calling 804-864-6124 or 202/358-1738.

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release:

RELEASE NO. 93-106

LANGLEY STORY OPPORTUNITIES -- NOVEMBER 1993

HOMESTYLE PHYSICS FEATURED. Langley's Nov. 8 colloquium features "Demonstrations of Physical Phenomena," a potpourri of demonstrations designed to appeal to engineers and applied scientists, followed that evening with a program at the Virginia Air and Space Center geared to high school and college students. The presentations, by Drs. D. Rae Carpenter, Jr. and Richard B. Minnix of Virginia Military Institute, are designed to be entertaining and educational. The colloquium begins at 2 p.m. at NASA Langley. A press briefing is scheduled for 1:15 p.m. Both events will be at NASA's H.J.E. Reid Conference Center, 14 Langley Blvd. The similar, evening lecture begins at 7:30 p.m. Nov. 8 at the Virginia Air and Space Center's IMAX theatre, Hampton, Va., as part of the Daily Press-NASA Sigma Series. The Sigma lecture is free and open to the public.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

FREE SPACE ENVIRONMENTS AND EFFECTS DATA BASE. Results from the Long Duration Exposure Facility (LDEF) -- the satellite that carried dozens of materials and other experiments in low-Earth orbit for six years -- are being gathered into a data base and will be available free to the user community. Meanwhile, researchers from nine countries will meet in Williamsburg, Va., Nov. 8-12 for the third LDEF symposium. Data and analysis from other space experiments (including the European Eureca) will also be presented. LDEF materials, interviews and photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

KEEP THOSE 'RAYS' COMING!! A solar-powered electric car built by students and faculty at California State University, Los Angeles will compete in the 2,000-mile 1993 World Solar Challenge race Nov. 7 in Australia. The Solar Eagle II received technical and financial support from NASA Langley's Education Office. The car is "environmentally safe," was built with all volunteer labor and travels at 50 mph. It is one of many Langley programs aimed at supporting science and math at the college level. Video of last year's race; photos of model, materials, interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

TECHNOLOGY TRANSFER SUCCESS STORIES. Plain language case studies that detail five aerospace technology transfer success stories are now available. Titles are:
o Saving Burn Victim's Pain and Lives: NASA's air and spacecraft flaw-detecting technology is now saving the lives and suffering of burn victims.
o NASA and Industry are Grasping the Future with Robots: NASA technology is sending robots instead of people to perform tasks in space, to clean up the ocean environment and to contain hazardous waste.
o NASA's Gleaming Satellite Adapted as Economic Giant: The legacy of NASA's - and the world's - first passive communications satellite is a booming industry with scores of applications.
o NASA, Lightning and the Glasair III LP: The first lightning-protected kit-built fiberglass aircraft is developed through NASA's Small Business Innovation Research Program.
o NASA Saves Lives with 'Groovy' Spinoff: Grooved runways and highways reduce deadly, costly accidents.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

ANNUAL HIGHLIGHTS BOOKLET AVAILABLE. The latest edition of NASA Langley "Research and Technology Highlights" booklet is available free to news media upon request. The 229-page report contains highlights of the major accomplishments and applications made by Langley researchers and by Langley university and industry partners during the past year. Topics include subsonic aircraft, high-speed civil transport, space transportation, space science, technology transfer and many more.
PUBLIC AFFAIRS CONTACT: Keith Henry FAX: (804) 864-6333 PH: (804) 864-6124

TOOLKIT TESTS CRITICAL SOFTWARE. Through the NASA Small Business Innovative Research (SBIR) Program, Reliable Software Technologies Corporation has extended the application of its automated software testability toolkit. The technology optimizes the software testing and verification process. It complements current approaches by reducing costs and improving reliability of critical software. Potential commercial uses include medical devices, nuclear control and monitoring, high speed transportation and air traffic control. Interview available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

QUEST FOR INNER STRESS. "Quest" -- a microscopic x-ray system -- is taking high-resolution looks inside solid structures while under stress. Specimens as large as 3 1/2 inches can be imaged, one thin slice at a time, to build an accurate picture of internal structure and internal structural variations when loads are applied. The system can shorten product development time and reduce the chance of failure. Among scheduled tests: A detailed look inside while new composite aerospace materials are stressed to failure. Interview available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

'EXPERT SOURCE MEDIA GUIDE' COMING. A NASA Langley aerospace expert source book for news media will be available later this year. It will catalog world-class technology experts, authorities and spokespersons for more than 150 aerospace topics, as featured at Langley's "TOPS" technology transfer show in October. Purpose of the the Guide is to provide bona fide interview sources to working members of the news media. Fax or call to reserve a copy.
PUBLIC AFFAIRS CONTACT: Kristina Murden FAX: (804) 864-6333 PH: (804) 864-8150

NASA News

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For Release:

December 6, 1993

RELEASE NO. 93-107

"What's New In Lasers" Is Colloquium Topic

Jeff Hecht will discuss advances in laser technology that are used in a range of consumer products and as powerful research tools at NASA Langley's December 13 colloquium.

His presentation features work done for semiconductor diode lasers, which are smaller, more compact, and easier to use than other available laser technology, and on solid state lasers.

Solid state lasers have been the focus of research and projects sponsored by NASA during the past 10 years, some at Langley Research Center, which represent major contributions to the improved solid state laser systems. Langley's Lidar In-Space Technology Experiment (LITE), which will fly on STS-64 Discovery in late 1994, uses solid state laser sensors to measure clouds, dust particles and temperature. LITE is the first lidar system flown in space for atmospheric studies and is an example of these new solid state lasers.

Large numbers of semiconductor diode lasers are used commercially in items like CD players, video disc systems, fiber optic communications, and computer storage systems. Promising new electronic structures allow making an array of many lasers at the surface of one electronic chip, which may produce higher power and better quality emitted beams than earlier chips that emitted asymmetric beams from the sides.

Hecht, cofounder and senior contributing editor for "Lasers and Optronics" magazine, is the Boston correspondent for "New Scientist" magazine. His presentation includes practical uses for laser technology--from medicine to industrial processes.

The colloquium begins at 2 p.m. A press briefing is scheduled for 1:15 p.m. Both events will be at the H.J.E. Reid Conference Center, 14 Langley Blvd.

Laser is an acronym for Light Amplification by Simulated Emission of Radiation.

- End -

NASA News

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For Release:

November 26, 1993

RELEASE NO. 93-108

STS-61 Scheduled for Launch December 1; Spacewalks Planned to Service Hubble Telescope

The launch of Shuttle Mission STS-61 Endeavour is scheduled for 4:57 a.m. EST on Wednesday, Dec. 1, from the Kennedy Space Center, with landing scheduled at Kennedy for Dec. 12 at 2:42 a.m. EST. This mission is the first in a series of planned visits to the orbiting Hubble Space Telescope (HST).

Mission objectives are threefold: restoring the planned scientific capabilities to the HST, restoring reliability of HST systems, and validating the HST on-orbit servicing concept. Replacement of the spacecraft's solar arrays, HST's source of electrical power, tops the primary servicing task list. The arrays will be replaced because solar array jitter, or excessive flexing, which happens when the telescope passes form cold darkness into warm daylight, may be compromising the structural integrity of the arrays.

The 11-day mission has scheduled a record five spacewalks with the capability for two more if needed.

Mission Commander Dick Covey leads the seven-member crew. Pilot is Ken Bowersox. Mission specialists are Kathy Thornton, Claude Nicollier, Jeff Hoffman, Story Musgrave and Tom Akers. Spacewalks are planned for flight days 4-8.

If we can assist with your news coverage of these events, call the NASA Langley Public Affairs Office at 864-6122.

-End-

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release:

RELEASE NO. 93-110

LANGLEY STORY OPPORTUNITIES -- DECEMBER 1993

LANGLEY NEWSROOM AVAILABLE FOR HUBBLE SERVICING MISSION. The current STS-61 Endeavour mission is the first in a series of planned Space Shuttle visits to the orbiting Hubble Space Telescope. Replacement of the solar arrays, HST's source of electrical power, is one of the highest priorities in the primary servicing task list. The arrays will be replaced because of their jitter, or excessive flexing, which happens when the telescope passes from cold darkness into warm daylight. Five spacewalks are scheduled. Landing is scheduled at Kennedy Space Center approximately 12 days after launch. NASA Select programming can be accessed through GE Satcom F2R, transponder 13. Frequency is 3960 MHz with orbital position of 72 degrees West Longitude.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

LANGLEY STUDIES TROUBLESOME HUBBLE 'JITTER.' Langley is developing technology to control jitter of flexible structures in space, like that being experienced by the Hubble Space Telescope (see above). The wide-ranging research program, called Controls Stuctures Integration, CSI for short, also includes control of jitter for future missions like those planned for the multi-satellite Earth Observing System. Interview available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NASA CHIEF SCIENTIST TO SPEAK. Dr. France Anne Cordova will discuss her goals, objectives and vision as NASA's Chief Scientist Dec. 6 at 1 p.m. at NASA Langley's H.J.E. Reid Conference Center, 14 Langley Blvd. Since mid-October she has served as the NASA Administrator's senior scientific advisor. She is on loan to NASA from Pennsylvania State University, where she heads the Astronomy and Astrophysics Department. Interviews by appointment are available the afternoon of Dec. 6.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

LANGLEY TECHNOLOGY GOES WEST. Technology 2003 -- a high technology showcase in Anaheim, Calif., Dec. 7-9 -- will feature eight exhibits of Langley's innovative research available for license or sale. Exhibits include Langley's composite materials, including a carbon-carbon piston; a thermal non-destructive evaluation system developed to evaluate airworthiness of aircraft structures suitable for other commercial applications; and thin films and coatings that have high resistance to radiation and can be used for items like satellite antennas, high-performance paints and coatings, and for eye lens implants. Technology 2003 is sponsored by NASA, NASA Tech Briefs and the Technology Utilization Foundation and includes more than 250 exhibitors at the Anaheim Convention Center. Interviews, materials available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

CIVIL AIRCRAFT, OZONE FEATURED AT NEWTECH '93. NASA Administrator Dan Goldin will discuss the future of civil aircraft technology, and Langley's Dr. M. Patrick McCormick will discuss the human impact on ozone and climate as part of NEWTECH '93, Dec. 10, at the Continuous Electron Beam Accelerator Facility (CEBAF) in Newport News, Va. The event, an annual update on recent developments in science and technology, is presented by Virginia First District Congressman Herb Bateman.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

WHAT'S NEW IN LASERS? Jeff Hecht will discuss advances in laser technology used in a range of consumer products and as powerful research tools at NASA Langley's Dec. 13 colloquium. His presentation features work for semiconductor diode lasers, which are smaller, more compact and easier to use than other available laser technology, and on solid state lasers. An example of Langley's contribution to improved solid state laser systems is Langley's Lidar In-Space Technology Experiment (LITE), which will fly on STS-64 Discovery in late 1994. LITE uses solid state laser sensors to measure clouds, dust particles and temperature. The colloquium begins at 2 p.m. A press briefing is scheduled for 1:15 p.m. Both events will be at the H.J.E. Reid Conference Center, 14 Langley Blvd.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NEW SMALL BUSINESS RESEARCH. Thirty-six companies from 18 states have been selected to work with Langley as part of NASA's 1993 Small Business Innovation Research Program. The companies -- small, high technology businesses -- have been selected for negotiation of 38 Phase I contracts worth up to $70,000 each. Research subjects are in areas of structures and materials, acoustics, aerodynamics, aircraft storm hazards, general aviation, and tooling and manufacturing systems, among others. In all, NASA will select 380 research proposals for the 6-month, fixed-price contracts. Langley expects to be funded for an additional 15 Phase I contracts by the end of the week. Interview available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

JET FLIGHT TESTS MIMIC LIFTING BODY LANDING. A team of researchers from Langley and NASA's Goddard-Wallops Flight Facility are demonstrating that the conceptual lifting body spacecraft, HL-20, can land safely following an on-pad abort. A 2-seat NASA T-38A jet is conducting a series of tests that simulate the emergency landing maneuver from apogee (10,500 ft/3,185 m) to landing flare (25 ft/4.6 m). The small, vertically launched spacecraft concept is a candidate for carrying people and supplies to and from the U.S. international space station. Also being demonstrated in the flight tests is a Wallops program-mable instrument landing system for steep, curvilinear approachs. Interviews, photo opp.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

AEROSPACE EXPERT SOURCE BOOK FOR MEDIA. A NASA Langley aerospace expert source book for news media is available. The 63-page book is a compilation of world-class technology experts to serve as interview sources for more than 160 aerospace technology specialities, as featured at Langley's recent "Technology Opportunities Showcase." Fax or call to reserve a copy.
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- End -

NASA News

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January 10, 1994

Release No. 94-01

Space Station is First Colloquium Topic of New Year

NASA Langley's Jan. 31 colloquium features Dr. Ralph Muraca, who will discuss the evolution of the space station configuration, with emphasis on configurations developed during the March to June 1993 time frame.

The presentation will concentrate on configurations developed by teams at three NASA centers -- Langley Research Center, Marshall Space Flight Center, and Johnson Space Center -- to reflect the schedule, cost constraints and requirements levied on NASA by the Clinton Administration. The current joint United States-, European-, Japanese-, Canadian- and Russian-configuration will also be discussed.

Muraca will also review the earliest thoughts about uses for an orbiting space station and some proposed configurations.

Muraca joined NASA in 1962 following 3 years employment in the aerospace industry working for General Dynamics and Martin Marietta. A former deputy manager of the Center's space station activities, he is currently chief of the Systems Engineering Division in Systems Engineering and Operations.

A resident of Poquoson, he received his B.S. degree from the Drexel Institute of Technology, his M.S. degree from the University of Virginia and his Ph.D. from Virginia Tech.

A press briefing is planned for 1:15 p.m., with the presentation beginning at 2 p.m. Both events will be at the H.J.E. Reid Conference Center, 14 Langley Blvd.

-End-

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

RELEASE NO. 94-002

For Release:

LANGLEY STORY OPPORTUNITIES -- JANUARY 1994

HIGH TECH HIGHLIGHTS. Selected Langley highlights from 1993 are featured in a four and one-half minute video being prepared for broadcast by NASA via satellite (see below for coordinates). Call now for your "sneak preview" copy. Subjects include:

- o Langley's Technology Opportunity Showcase:
  - o Carbon-carbon piston considered for work and play applications.
  - o Langley teams with Cal State L.A. to build, race "Solar Eagle II" across Australia.
  - o Lightning-protected, kit-built aircraft called a NASA-industry success story.
- o High Speed Research Program/High-Speed Civil Transport.
- o HALOE satellite instrument continues to make ozone news.
- o LITE Shuttle payload prepared for 1994 launch, laser studies.
- o LDEF will move to Kennedy Space Center's Spaceport U.S.A.

PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

NEW NASA SATELLITE COORDINATES. In case you missed the announcement, NASA's television system, NASA Select, has been reconfigured to transmit on a different satellite transponder. Transmissions will be on Spacenet 2, transponder 5, located at 69 degrees West with horizontal polarization. Frequency will be on 3880.0 Megahertz, audio on 6.8 Megahertz.
PUBLIC AFFAIRS CONTACT: Dwayne C. Brown (202) 358-0547

MEET AN ASTRONAUT. Byron Lichtenberg, who has flown two Space Shuttle missions as a payload specialist, will be at the Virginia Air & Space Center and Hampton Roads History Center at 1 p.m., Saturday, Jan. 22. Lichtenberg will discuss his 1983 and 1992 space journeys. He has represented more than 100 scientists from all over the world on his two missions. Visitors can meet Lichtenberg with basic admission to the Center.
VIRGINIA AIR & SPACE CONTACT: Kim Hinson (804) 727-0900 x731
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

HOW SPACE STATION IS SHAPING UP. NASA Langley's Jan. 31 colloquium features the evolution of the Space Station configuration, especially development of the most recent candidate configurations. Dr. Ralph Muraca, a former Langley Space Station manager, will also discuss the earliest thoughts about uses for an orbiting space station. A press briefing is planned for 1:15 p.m., with the presentation beginning at 2 p.m. Both events at the H.J.E. Reid Conference Center, 14 Langley Blvd.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NASA USING RUSSIAN HIGH-SPEED FACILITY. NASA Langley is conducting experiments in a unique Russian aerodynamic facility. Called PGU, for Piston Gas-Dynamic Unit, the facility is located at a major Russian technology center northeast of Moscow. Scientists at this center developed a unique hypersonic implulse facility with much longer run times (up to seconds) than Western devices (milliseconds). A hypersonic facility tests airplane or spaceplane models at speeds of 3,500 mph and greater. Langley is conducting hydrogen combustion experiments in the PGU to study the flow establishment physics of high speed combustion. This information will aid in evaluation of propulsion results from similar U.S. facilities. Interview available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

'MISSION EARTHBOUND' TAKES OFF VIA PBS, VIDEOCONFERENCE SERIES. A new six-part educational series will help students and teachers better explore, discover and understand global change. The NASA Langley-sponsored national videoconference series begins Jan. 14. It will help participants see the world from a different perspective and better understand the role each person plays in affecting the future of Earth. The series will be carried via satellite and rebroadcast by PBS and multiple distance learning networks. Interviews, materials available. Call 1-800-548-4807 for registration information.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NEW DEVICE DETECTS FATIGUE IN AIRCRAFT. A new lightweight, compact and portable eddy-current flaw detection device, developed at NASA Langley, provides a clear indication of flaws in aging aircraft and is extremely sensitive to fatigue cracks in an aircraft's fuselage. Initial research results indicate that the device could be effective in locating surface damage in a vast array of materials, including ferromagnetic steels. The technology is protected by a patent application. Interviews, photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

STILL AVAILABLE: AEROSPACE EXPERT SOURCE BOOK FOR MEDIA. A NASA Langley aerospace expert source book for news media is available. The 63-page book is a compilation of world-class technology experts to serve as interview sources for more than 160 aerospace technology specialities, as featured at Langley's recent "Technology Opportunities Showcase." Fax or call to obtain a copy.
PUBLIC AFFAIRS CONTACT: Keith Henry FAX: (804) 864-6333 PH: (804) 864-6124

- End -

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

RELEASE NO. 94-004

For Release:

LANGLEY STORY OPPORTUNITIES -- FEBRUARY 1994

'CLEMENTINE' TO KICK METEORIOD DETECTOR OUT OF NEST. A one-pound Langley experiment is getting the ride of its life while piggybacking on the Ballistic Missile Defense Organization's Clementine satellite. Clementine is primarily intended as a space-travelling platform to demonstrate advanced lightweight space technologies for the Department of Defense while conducting investigations for NASA of both an asteriod and the Moon. Langley's "Orbiting Meteoroid & Debris Counter" experiment, which is scheduled to separate from the spacecraft on Feb. 2, will help establish the density of very small man-made debris and natural meteoroids at different altitudes between the Earth and the Moon. The first useable data is expected to be received by Feb. 8. Interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NEW PISTON CONCEPT ON THE RISE. A carbon-carbon composite piston created at Langley has sparked the interest of both General Motors and Briggs & Stratton. Agreements for further development of this technology will be formalized with both companies by mid-February. Ford Motor Co. and John Deere are interested in similar agreements. Commercial uses include high-performance and lightweight diesel engines, NASCAR and Formula One engines, and recreational vehicles such as snowmobiles, jet skiis and motorcycles. Interview, photos available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

'ENERGY, SECURITY & ENVIRONMENTAL REALITIES' TOPIC OF TALK. Langley's Feb. 14 colloquium features Henry E. Thomas, former assistant secretary for international affairs and emergencies, speaking on "Global Energy, Security and Environmental Realities." Thomas will discuss the energy crisis -- is it real ? -- and the importance of the answer. The talk begins at 2 p.m., preceded by a press briefing at 1:15 p.m. Both will be at NASA's H.J.E. Reid Conference Center, 14 Langley Blvd. Thomas will present the same lecture at 7:30 p.m. that evening in the Virginia Air and Space Center's IMAX theatre as part of the Sigma Series, free public lectures sponsored by the Virginia Air and Space Center, the Daily Press and NASA Langley.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

'MISSION EARTHBOUND' TELECASTS UNDERWAY. The third in a six-part Langley-sponsored educational TV series will air Feb. 25 on PBS and multiple distance learning networks. Mission Earthbound helps students and teachers take an electronic field trip to Planet Earth to study its complex balance of atmosphere, oceans, chemistry and temperature. Viewers may call or fax questions during the live, one-hour programs. Other dates: March 25, April 29 and May 27. For videotape copies of programs, call 1-800-548-4807. Interviews, materials available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

PRESSURE SENSITIVE PAINTS SAVE RESEARCH MONEY. NASA Langley is developing new pressure sensitive paints that can be used to measure surface air pressures -- to include the entire surface of models in wind tunnels. The new paints promise to reduce the cost of building models and to provide data on surfaces that cannot be measured with current technology. Interviews and photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

LANGLEY EXPERIMENT FLIES ON STS-62 IN MARCH. Langley's MODE (Middeck 0-gravity Dynamics Experiment) will test the forces the crew exerts on the Shuttle during their normal mission activities. This information, which will be gathered over 67 in-flight hours, will be used in the design of space station. This will be a 14-day mission aboard Columbia. Interviews, photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

AEROSPACE EXPERT SOURCE BOOK FOR MEDIA. A NASA Langley aerospace expert source book for news media is available. The 63-page book is a compilation of world-class technology experts to serve as interview sources for more than 160 aerospace technology specialties, as featured at Langley's recent "Technology Opportunities Showcase." Fax or call to obtain a copy.
PUBLIC AFFAIRS CONTACT: Keith Henry FAX: (804) 864-6333 PH: (804) 864-6124

FEATURE PHOTOGRAPHY:

AVIATION WEEK '93 PHOTO CONTEST WINNERS. In their 1993 annual photo issue, Aviation Week & Space Technology magazine featured 8 Langley photographs. Included are first and third place winners in the magazine's Best-of-the-Best photo contest. Subjects include flow visualization of the F-16XL wind tunnel model, dramatic view of wind tunnel interior, laser examination of composite specimen, Space Shuttle model tested at Mach 6, hypersonic engine between tests, advanced military transport model tests, NASA hangar providing aircraft shelter from hurricane, and F-16XL, a one-of-a-kind aircraft.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124
Also available from NASA Headquarters Broadcast & Imaging Branch (202) 358-1900

- End -

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release:

Feb. xx, 1994

H. Keith Henry
Langley Research Center, Hampton, Va.
Phone: 804-864-6124 (w)
804-826-8916 (h)

Release No. 94-013

NASA Langley Announces New Organization

NASA Langley Research Center is implementing a major reorganization of its management and operating structure to better reflect the needs of its customers and to respond to changing national priorities.

The changes were approved Feb. 15 by NASA associate administrator for aeronautics, Wesley Harris. All employees were reassigned effective Feb. 20.

In making the announcement, Langley center director Paul F. Holloway said, "Our rationale for change is a reflection of the changes in the roles and mission of NASA as an agency and the evolving program at Langley. They are also a direct result of the changes occurring in the federal government due to the findings of the National Performance Review conducted by vice president Al Gore."

These changes are not expected to affect the center's overall budget nor the number of employees working at the center.

According to Dr. Belinda Adams, Langley assistant director and leader of the center redesign team, Langley is increasing its support of non-traditional customers, i.e., non-aerospace companies looking for new technology with potential for commerical profit. Langley's 77-year history of direct partnerships with industry readily fits the Administration's goal of capitalizing on federal laboratories to enhance the nation's economic competitiveness.

Dr. Adams also cited the "need to do more with less," in response to continuing federal budget pressures, as motivation for moving to a customer focussed and process oriented organization in which continous improvement and process redesign can thrive. She said this will aid Langley's quest for the NASA administrator's goal of

- more -

a "better, faster, cheaper" NASA.

Langley's new organization chart lays out the center's commitment to both traditional and non-traditional customers.

The following organizational elements are new:

o AERONAUTICS PROGRAM GROUP. Responsible for aeronautics programs. Expected to have approximately 75 people assigned. The group consists of 1 division and 4 offices:

--Aeronautics Systems Analysis Division. Studies total aircraft systems interactions for various vehicle classes to help define and conduct the center's aeronautics programs.

--Transport Office.

--High Performance and High Speed Aircraft Office.

--Hypersonics Office.

--Critical Disciplines, Facilities and High Performance Computing and Communications Program Office.

Each office serves as the center's external point of contact for programs in its area.

o SPACE AND ATMOSPHERIC SCIENCE PROGRAM GROUP. Responsible for space-related programs. Expected to have approximately 200 people assigned. The group consists of:

--Space Systems and Concepts Division. Mission and systems study areas include space transportation, spacecraft and platforms, remote sensing, and space flight utilization.

--Technology thrust areas: Space Transportation, Spacecraft, Remote Sensing.

--Atmospheric Sciences Division. Responsible to sustain a world-class atmospheric science program focussed on understanding global change.

--Space Flight Projects Office.

o TECHNOLOGY APPLICATONS GROUP. Leads the center's technology transfer effort, with emphasis on non-aerospace industry. Expected to have less than 50 people assigned. Responsibilities include planning and implemention of the Center's programs in:

--Small Business Innovative Research.

--Patent and Licensing.

--Technology Applications and Commercialization.

o RESEARCH AND TECHNOLOGY GROUP. Responsible for basic research and technology and for implementing aeronautics and space technology programs.

Expected to have approximately 800 people assigned. Consists of 7 discipline-oriented research divisions:

--Gas Dynamics Division. High speed, high temperature gas dynamics for hypersonic flight.

--Fluid Mechanics Division. Advanced flow control, acoustics and aerodynamic design methods.

--Aerodynamics Division. Aircraft aerodynamics and propulsion integration from subsonic to supersonic speeds.

--Structures Division. Aircraft and spacecraft structures.

--Materials Division. Structural materials development for aircraft and spacecraft.

--Flight Dynamics & Control Division. Aircraft flight dynamics and aeronautical and space guidance and control.

--Information and Electromagnetic Technology Division. Information technology for airborne and spaceborne applications.

o INTERNAL OPERATIONS GROUP. Provides technical and administrative services to Langley. Expected to have approximately 1600 people assigned. Consists of 11 divisions and 3 offices:

--Planning & Resources Management Office

Administrative Services:

--Acquisition Division

--Logistics Management Division

--Scientific & Technical Information Division

Facilities Engineering & Operations:

--Facilities Program Development Office

--Facility Systems Engineering Division

--Experimental Testing Technology Division

--Operations Support Division

--8-Foot High Temperature Tunnel Shakedown Project Office

Engineering & Information Systems:

--Fabrication Division.

--Aerospace Mechanical Systems Division

--Information Systems Division

--Aerospace Electronic Systems Division

--Flight Operations and Support Division

The following organizational elements remain the same or nearly so:

o OFFICE OF THE DIRECTOR. In addition to the Offices of External Affairs, Equal Opportunity and Education, it now includes three offices previously located elsewhere:

--Office of Chief Counsel.

--Safety, Environmental and Mission Assurance Office. Formerly the Systems Safety, Quality and Reliability Division.

--Office of Human Resources. Formerly the Human Resources Management Division.

o HIGH SPEED RESEARCH PROJECT OFFICE. The lead agency office for development of supersonic technologies leading to a second-generation high-speed civil transport.

o HYPERSONIC VEHICLE OFFICE. Formerly the National Aerospace Plane Program Office, it continues to serve as the lead agency office for development of hypersonic technologies.

o OFFICE OF THE COMPTROLLER.

An organization chart graphic follows this release.

Other details of the new groups:

o Aeronautics Program Group: Responsible for planning and guiding aeronautics programs for the center. The group will lead the center's strategic planning for aeronautics and will be the single point of contact for committing the center to aeronautics programs. It will interact with customers and perform aircraft vehicle studies to obtain an integrated set of research objectives. It will also provide program management for focussed programs when the implementation is distributed across several organizations at Langley. The vehicle class leaders in the group will work with external customers and the other Langley groups to define specific programs to accomplish the objectives. The group is responsible for resource allocation and for reporting aeronautics program results.
Group director: Dr. Jeremiah F. Creedon; deputy: Wallace C. Sawyer.

o Space and Atmospheric Science Program Group: Responsible for guiding and supporting space programs for the center. The group will lead space strategic planning, including identification and integration of customer-driven high-payoff goals, technology requirements and science objectives. It will also conduct the atmospheric science program and, in partnership with the Internal Operations Group, will lead space flight project management. Additionally, this group will conduct systems analyses in concert with Langley technology efforts and in support of NASA Headquarters program offices. The space technology thrust office leaders interact with external customers, NASA Headquarters, other centers, other organizations at Langley and other agencies to form partnerships, to plan and to manage focussed

technology programs.
Group director: Darrell R. Branscome; deputy: Joseph B. Talbot.

o Technology Applications Group: Responsible for leading the transfer of Langley-sponsored technology to commerical customers, both aerospace and non-aerospace. This group greatly expands the center's mission to transfer technology to non-aerospace U.S. companies for creation of commercial opportunities. Examples of non-aerospace industries include automotive, materials, software and instrument businesses. They will also represent the center to the aerospace industry's second tier contractors such as those with commercial and/or military applications. Working hand-in-hand with Langley technologists, the new group's technology and licensing agents will lead the transfer of Langley-sponsored technology to industry customers. Plans are to double the size of the Small Business Innovative Research team to accommodate the growth in this program. Also, the Technology Applications Group plans to form a technology council to help identify the industries Langley should pursue, and what patents and technologies are most viable for commercial applications.
Group director: Charles P. Blankenship; deputy: Dr. Joseph S. Heyman.

o Research and Technology Group: Responsible for basic research and technology development in a broad range of aeronautical and selected space disciplines. Through an interdisciplinary approach, the group will produce proven and usable technology for aerospace and non-aerospace industry customers. It will also seek new technology opportunities for aeronautics and space. It will support Langley's Aeronautics and Space & Atmospheric Sciences Program Groups in program planning, development and advocacy. It will implement Langley's research and technology program in partnership with Langley's Internal Operations Group and work cooperatively with Langley's Technology Applications Group to transfer research and technology program products to non-aerospace customers. Program implementation will be primarily through self-directed work teams drawing people across organizational lines.
Group director: Dr. Douglas L. Dwoyer; deputy: Dr. John B. Malone.

o Internal Operations Group: Responsible for providing a broad range of technical and administrative services to Langley. It will be actively involved in the planning of new and revised center programs and will team with the other groups to implement the center's research and technology program. This group also provides all services for the operation of "the city of Langley." The Internal Operations Group, in close cooperation with center customers, will lead the development of a new operational strategy to ensure the long-term health of Langley through "revolutionary versus evolutionary" process improvements.
Group director: Dr. Kristin A. Hessenius; deputies: Sammie D. Joplin, John F. Stokes and Dr. Robert T. Wingate.

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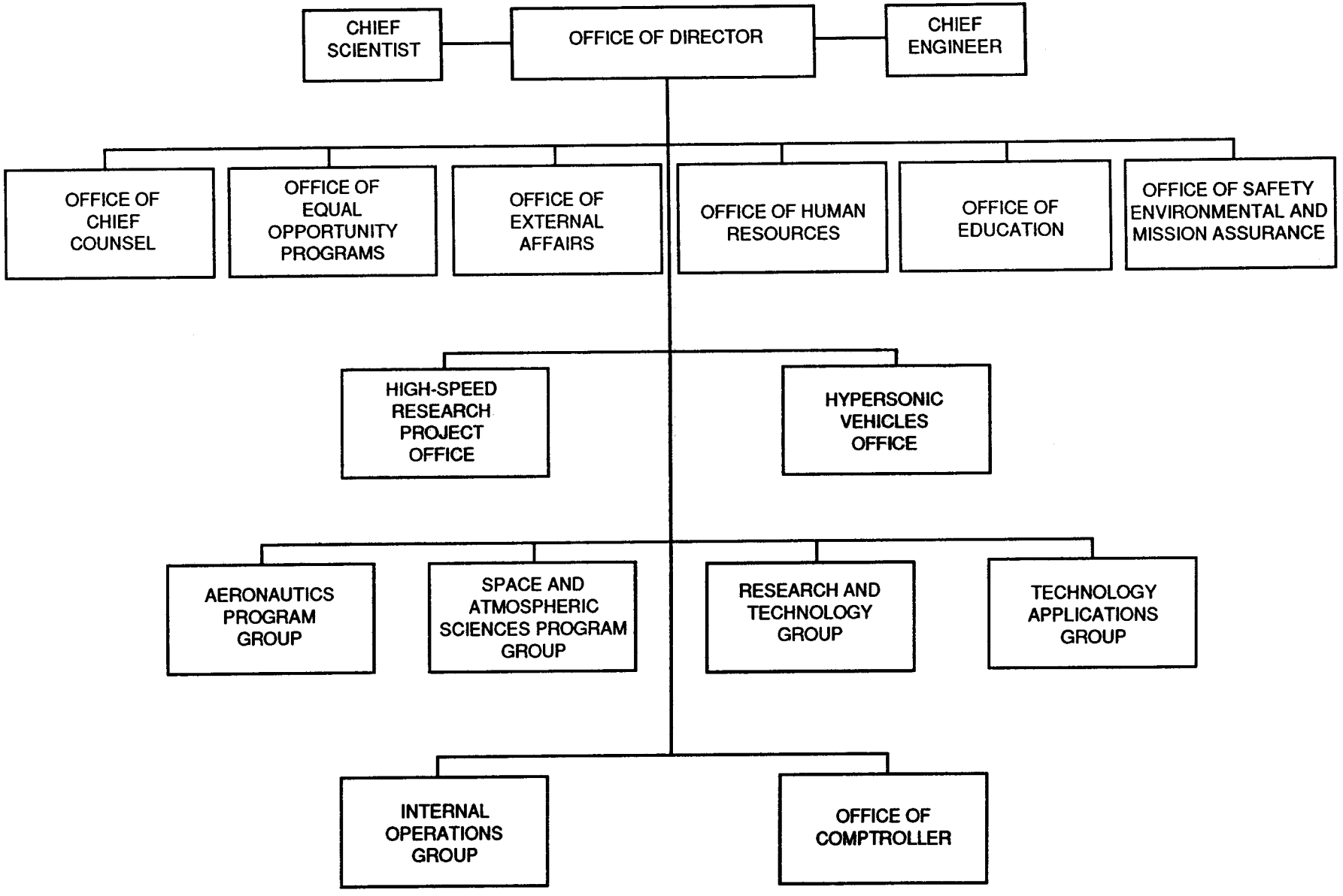
LANGLEY RESEARCH CENTER



NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

RELEASE NO. 94-014

For Release:

LANGLEY STORY OPPORTUNITIES -- MARCH 1994

NASA LANGLEY ANNOUNCES NEW ORGANIZATION. Langley is implementing a major reorganization of its management and operating structure to better reflect the needs of its customers and to respond to changing national needs. For details, look for Langley release #94-013, issued Feb. 24.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

LANGLEY EXPERIMENT FLIES ON STS-62. Langley's MODE (Middeck 0-gravity Dynamics Experiment) will fly aboard Columbia on March 3 to test the forces the crew exerts on the Shuttle during their normal mission activities. This information, which will be gathered over 67 in-flight hours, will be used in the design of space station. This will be a 14-day mission. Interview, photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

SATELLITE TETHERED SECOND TIME AROUND. Langley will participate in its second Small Expendable Deployer System (SEDS) mission on March 9, when a small tethered satellite will be launched from an expendable Delta rocket from Cape Canaveral, Fla. SEDS is a versatile and economical system for delivering smaller payloads on relatively low-cost missions.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

NEW VALUES IN THE INFORMATION SOCIETY? Crime and the Information Society is the topic of NASA's Tuesday, March 15 colloquium at 2 p.m. Marc Rotenberg, director of Computer Professionals for Social Responsibility, will discuss topics such as "Should access to a database be considered a criminal act?" and "Should we punish people who copy electronic information?" Location is the H.J.E. Reid Conference Center, 14 Langley Blvd. Press conference at 1:15 p.m. A similar lecture, free and open to the public, will be presented at the Virginia Air and Space Center the evening before, on March 14 at 7:30 p.m., Hampton, Va., as a part of the VASC-Daily Press-NASA Sigma Series.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

HIGH-SPEED TRAIN RESEARCH ON SAFETY TRACK. A cooperative research agreement between Union Switch and Signal Corporation, U.S. Army Joint Research Programs Office, and NASA Langley allows current NASA R&D activities, originally intended for the U.S. aerospace industry, to be used in analyzing the safety of critical railway system designs. These R&D activities include using mathematical logic to provide assurance of correct system design and software to assess the system's failure rate.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6124

- more -

A PLAN TO REVITALIZE GENERAL AVIATION. A task force report to the NASA Aeronautics Advisory Committee will be released soon, outlining suggestions for revitalizing America's vital general aviation industry. Langley leads NASA's general aviation research program. Interview, video and photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

NEW PHOTO METHOD CAPTURES 'INVISIBLE' SHOCK WAVES. A first-ever direct schlieren photograph of supersonic shock waves over an in-flight aircraft has been taken. Schlieren photography measures the change in density in the flow over an aircraft. The plane flew between the sun and a telescope equipped with a special optical system. The photograph clearly shows the shock wave structure around the plane. This technology will be useful for both sonic boom and high speed aerodynamic studies. Interview, photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

EXPLOSIVE JOINING TECHNIQUE IS 'DYNAMITE.' NASA Langley's invention of an explosive joining technique to bond metals with a precision seam weld has peaked the interest of a Hampton, Va. electrical transformer manufacturer. The technique uses tiny amounts of explosive to join aluminum directly to copper, producing a permanent joint with conductivity similar to the parent metals.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6124

BREAKING GROUND FOR RELIABLE AIRCRAFT COMPUTERS. High-intensity radiated fields (HIRF), caused by radars, radio and television broadcast transmitters, and other emitters of electromagnetic energy, threaten the safety of aircraft now on the drawing boards. Because of lightweight construction, advanced aircraft have a decreased ability to shield themselves. Test methods are being developed to make the aircraft computers more reliable. Research results are being transferred to private industry and other government agencies. Photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

BAD GASES GET THE BOOT. NASA Langley has developed technology to combat the buildup of contaminant gases in modern, energy-efficient buildings designed to be tightly sealed. This new technology converts air contaminants, such as carbon monoxide, into harmless indoor air products, such as carbon dioxide. Commercial uses include indoor air purification, auto emission control and emission control for non-automotive applications. Interview available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6124

CONSEQUENCES OF HUMAN ACTIVITIES ON GLOBAL CLIMATE. NASA Langley's MAPS (Measurement of Air Pollution from Satellites) experiment, which measures how carbon monoxide is distributed in the free troposphere, is to fly on STS-59 in April. MAPS will evaluate the effect the four seasons have on this key atmospheric trace gas. The data generated will help scientists understand the consequences of human activities in global climate change. Interviews and photos available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

A LOOK AHEAD -- APRIL. Educators nationwide will meet April 6-9 to expand their knowledge, update their aviation and space curriculum, and witness education reform activities at the 27th National Congress on Aviation and Space Education conference in Norfolk, Va. This premier conference for the aerospace education community is expected to attract more than 1,000 educators. Sponsored by NASA, the Civil Air Patrol and the Federal Aviation Administration. To register, call 1-800-789-7887. Interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- end -

NASA News

National Aeronautics and
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For Release:

March 3, 1994

RELEASE NO. 94-015
Hampton, Virginia

Is Crime a Concern in the Information Society?

Do we punish to protect and punish to preserve? This and other issues will be addressed at NASA Langley Research Center's March 15 colloquium on "Crime and the Information Society."

Marc Rotenberg, director of Computer Professionals for Social Responsibility, a national organization of professionals in the computing field, and a professor of law at Georgetown University, believes that what people choose to protect and preserve in the information society may be very different from what was safeguarded in the past. "Is access to a database a criminal act, and should people who copy electronic information be punished?" he asks.

Rotenberg believes that in some cases traditional legal principles provide guidance, although, in others, citizens may have to ask more fundamental questions about the values that must be preserved in the information society.

The colloquium begins at 10 a.m. A press briefing is scheduled at 9:15 a.m. Both events will be at NASA's H.J.E. Reid Conference Center, 14 Langley Blvd. Media who plan to attend the briefing should call 804-864-6122 by 8:30 a.m. on March 15.

Rotenberg will also present a similar lecture at 7:30 p.m. on Monday, March 14 at the Virginia Air and Space Center's IMAX theatre as part of the Sigma Series. The Sigma Series is a series of free public lectures sponsored by the Virginia Air and Space Center, the Daily Press and NASA.

-End-

Note to Editors: The day and the time for monthly colloquiums at NASA Langley have been changed to Tuesdays at 10 a.m.

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release:

February 25, 1994

Drucella Andersen
Headquarters, Washington, D.C.
(Phone: 202/358-4733)

Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6120)

RELEASE: 94-016

REPORT CALLS FOR GREATER NASA GENERAL AVIATION ROLE

In a report released today, an industry-led task force calls on NASA to revitalize its general aviation program, make its wind tunnels, laboratories and simulators more accessible to the general aviation community and better balance its technology program to meet general aviation needs.

"This report will help us shape our general aviation research for the rest of the decade," said NASA Administrator Daniel S. Goldin. "We're determined to focus on technologies that will be useful to our partners in industry."

General aviation covers a wide range of aircraft and services as a vital part of the national air transportation system serving some 17,800 airports, provides the only air transportation for millions of people to many communities throughout the United States and the world, provides some 540 thousand U.S. jobs and is a potentially significant contributor to the U.S. balance of trade.

The report by the General Aviation Task Force of NASA's Aeronautics Advisory Committee, citing the serious decline in general aviation aircraft deliveries since the early 1980s, highlights four NASA technology research areas that it characterizes as "most important and potentially the most productive" for increasing market share. They are:

-- Propulsion, noise and emissions work to let U.S. aircraft meet world

- more -

environmental standards and be more reliable, fuel-efficient and easier to fly;

-- Aeronautical systems research that would put new technology in the cockpit to expand the use of general aviation and increase safety;

-- Structure and materials development that would transfer data on advanced metals and composites to the general aviation industry; and

-- Aerodynamics research that would increase aircraft speed, passenger capacity and fuel efficiency.

The report also calls for NASA and the Federal Aviation Administration (FAA) to better disseminate research information to the general aviation industry and to develop closer ties among NASA, industry and universities.

NASA already has initiated and expanded its general aviation effort that is developing technology to improve the safety, utility, environmental compatibility and affordability of general aviation aircraft. Research activities headed by NASA's Langley Research Center, Hampton, Va., and supported by Lewis Research Center, Cleveland, and Ames Research Center, Mountain View, Calif., focus on three key areas:

-- Cockpit systems such as displays, controls and software that are more "user-friendly" and cut the time needed to learn and maintain piloting skills;

-- Low-cost design and manufacturing methods and ways to make general aviation aircraft more affordable to operate; and

-- Quieter propulsion systems producing less exhaust emissions and cabins with better pilot and passenger comfort.

The General Aviation Task Force includes representatives from the General Aviation Manufacturers Association, Textron Lycoming, Allied-Signal, Honeywell, Small Aircraft Manufacturers Association, Allison, Gulfstream Aerospace, Beech Aircraft, Cirrus Design, National Business Aircraft Association, Cessna Aircraft Company, Embry-Riddle Aeronautical University, Wichita State University, FAA, National Transportation Safety Board and NASA.

- end -

EDITORS NOTE: Copies of the General Aviation Task Force Report are available from the NASA Headquarters Newsroom. Fax requests to 202/358-4210 or -4335.

A videotape entitled, "Highways in the Sky," describes NASA research on a general aviation "cockpit of the future." The video length is 10:37 and is available to media representatives in either BETACAM SP or U-MATIC formats by calling 202/358-1733. A still photo is available by calling 202/358-1900.

Color:	B&W:
94-HC-64	94-H-68

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release:

Catharine G. Schauer
Work (804) 864-6122
Home (804) 898-8463

March 2, 1994

RELEASE NO. 94-017

NASA Langley Experiment Takes Off on STS-62

Shuttle Mission STS-62 is rescheduled for an 8:53 a.m. EST lift-off on March 4 from the Kennedy Space Center, when more favorable weather conditions are expected. Shuttle Columbia will carry NASA Langley's MODE (Middeck O-gravity Dynamics Experiment), which investigates how the microgravity of space flight influences the behavior of large space structures.

The MODE test article can be configured in different shapes typical of space structural forms, such as the truss of a space station. Information gained from the experiment will help engineers develop and verify analytical modeling capability for predicting the linear and nonlinear modal characteristics of space structures in a microgravity environment.

Another Langley experiment on STS-62 will test the forces the crew exerts on the Shuttle during their normal mission activities. This information, which will be gathered over 67 in-flight hours, will be used in the design of space station.

MODE has received three awards and citations from NASA Headquarters: the NASA Group Achievement Award, the Office of Aeronautics and Space Technology Commendation for Technology Excellence and the Office of Aeronautics, Exploration and Technology "First to Fly" Award.

This project is an excellent example of the 'faster, better, cheaper approach to obtaining information important to major NASA programs," according to Sherwin

-More-

Beck, MODE project manager. "Maximum use is made of the flight opportunity by conducting two different experiments with one high-performance controller and mass storage data system. The ancillary experiment on crew motion force measurements will provide needed information at less than one-tenth the cost of a dedicated experiment."

Even thought the work is funded by NASA's Office of Space Systems Development in direct support of the space station program, the information obtained will also be used in programs and flight projects sponsored by NASA's Office of Life and Microgravity Science and Applications.

The two-week mission reflects all the ways space exploration is helping reshape Earth, and it includes dozens of experiments ranging from materials processing to biotechnology, advanced technology and environmental monitoring.

Crew members are Mission Commander John H. Casper, who will be making his third flight, and Pilot Andrew M. Allen, who will be making his second flight. Mission specialists, all of whom will be making their third space flights, are Pierre J. Thuot, Charles D. Gemar, and Marsha S. Ivins.

Landing is scheduled for March 18 at 8:01 a.m. EST at Kennedy Space Center.

The launch and landing will be telecast over NASA's satellite television network from Kennedy Space Center in Florida and can be seen at the NASA Langley News Center, 3. S. Wright Street. Media who would like to cover these events should call the NASA Langley Public Affairs Office weekdays at 804/864-6122.

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Note to Editors:

A fact sheet on NASA Langley's MODE experiment and photos of the crew taken during a training session are available upon request.

NASA News

National Aeronautics and
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For Release:

April 1, 1994

RELEASE NO. 94-024

Sergei Sikorsky Speaks on "The Concept of the Helicopter"

Sergei Sikorsky presents a first-hand tracing of his famous father Igor's early days in aviation and his development of the first practical helicopter Tuesday, April 12, at NASA Langley Research Center. His colloquium talk is entitled "The Concept of the Helicopter."

The program includes descriptions of some of the earliest projects to create a vertical take-off and landing machine and addresses the challenge of helicopter technology. The program will focus on Igor's work and his fascination with the helicopter, which led him to design, build and test-fly the first practical helicopter, the VS-300, in 1939. This machine went through a series of modifications during its experimental phase. It ultimately transformed the idea of a single main lifting rotor from being a much criticized concept into being the basis for production aircraft.

Sergei Sikorsky remembers flying in the VS-300 as a passenger, with his father at the controls, in the late 1930s. A graduate from the University of Florence, Italy, with a degree in fine arts, he joined United Aircraft (now United Technologies) and began a series of foreign assignments in Europe and the Far East, which lasted for some 20 years and concluded with the co-production of the Sikorsky CG-53G transport helicopter for the German Armed Forces.

He is a member of numerous aviation-oriented associations and the recipient, among other awards, of the Italian Institute of Navigation's medal, Sweden's Royal Aeronautical Society Thulin Bronze Medal and a honorary doctorate of aviation management from Embry Riddle

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Aeronautical University.

The colloquium begins at 10 a.m. A press briefing is scheduled at 9:15 a.m. Both events will be at NASA's H.J.E. Reid Conference Center, 14 Langley Blvd.

Sikorsky will also present a less technical lecture, "A Pioneer's Perspective on Helicopters," at 7:30 p.m. on April 11 at the Virginia Air and Space Center's IMAX theatre as part of the Sigma Series. The Sigma Series is a series of free public lectures sponsored by the Virginia Air and Space Center, the Daily Press and NASA.

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NASA News

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STS-59

For Release:

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April 1, 1994

RELEASE NO. 94-026

Backgrounder

Measurement of Air Pollution from Satellite (MAPS) Flies on Shuttle

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Quick Look: NASA Langley's MAPS instrument is scheduled to fly April 7 on the Shuttle to identify the distribution of carbon monoxide (CO) in the atmosphere. Seasonal changes in CO distribution are a key area of study in climate change. Interviews and materials are available. Langley's Dr. Henry G. Reichle, principal investigator, will be at Johnson Space Center during the mission and will be available for telephone interviews.

NASA Langley Research Center's Measurement of Air Pollution from Satellite (MAPS) instrument lifts off April 7 at 8:07 a.m. ET from Kennedy Space Center when STS-59 Endeavour begins a nine-day mission to study the changing global environment.

The primary goal of the MAPS experiment is to measure the distribution of carbon monoxide in the atmosphere between the altitudes of 2 miles (4 km) and 10 miles (15 km). Real time data will be received from the Shuttle during the mission. Approximately four or five days into the flight, the MAPS team expects to have a global image for public release and to have astronauts who have been working on the experiment available to comment on their first-hand observations.

Carbon monoxide is a natural part of the atmosphere; however, humans are now adding an amount that is about equal to the natural amount. As a result, they are causing the chemistry of the atmosphere to change. These human-caused emissions of carbon monoxide will reduce the ability of the atmosphere to clean itself of other

chemicals, and that may have a long-term effect on the climate.

The carbon monoxide that is added by humans comes from the burning of forests and grasslands in the tropical regions and the burning of fossil fuels (mainly gasoline) in the northern mid latitudes. The actual size of these sources, the way that they change over the course of the year, and the patterns of the movement of the gas away from the source regions are not now well known. The MAPS data are useful in studying these factors.

The presence of carbon monoxide in the atmosphere causes a very small change in the heat being emitted by the Earth. The MAPS instrument detects this change. The change is unique to carbon monoxide almost as if the gas leaves a fingerprint. The instrument views the Earth from the payload bay during essentially the entire mission.

Data are both recorded on a tape recorder that is part of the instrument and transmitted directly to the ground using the Space Shuttle telemetry system. The signals will be processed at the Payload Operations Control Center to produce "quick look" maps of the carbon monoxide distribution. These quick look data will be used to plan the exact periods of data acquisition during the flight. Following the flight, the data from the tape recorder will be processed using more refined techniques, and they will be combined with ground based and aircraft based data obtained by collaborating scientists from several countries. This will present a more detailed description of the distribution of the gas than can be obtained by any single technique. STS-59 is the first MAPS flight with real-time data and the third MAPS mission.

The MAPS instrument first flew on the second flight of the Space Shuttle during mid-November 1981. During this flight, it obtained 12 hours of data that could be used to study the carbon monoxide distribution. The data showed that most of the carbon monoxide in the atmosphere at the altitudes measured by the MAPS experiment was located in the tropical regions rather than in the Northern Hemisphere. Further, the amount of carbon monoxide changed much more rapidly in the east-west direction than had been expected. The results implied that burning in the tropics was more important as a source of carbon monoxide than had been thought.

The MAPS experiment again flew on the Space Shuttle in October 1984. About 80 hours of data were obtained. These data clearly confirmed that burning in South America and southern Africa was a major source of carbon monoxide.

The overall flight plan for the present mission is very similar to the 1984 mission.

More data will be acquired on this flight because the tape recorder capacity has been increased. The availability of telemetry data will allow for improved planning during the flight, particularly in the areas of astronaut observations and photography of burning, and of coordination with ground based and aircraft observations.

It is expected that the data will show there is relatively little biomass burning in the Southern Hemisphere, which will be reflected in low carbon monoxide concentrations. The Northern Hemisphere, however, is expected to show relatively high mixing ratios because its sources are mostly from man, such as cars and factories, and do not change much over time. This flight will provide data from the Northern Hemisphere "Spring," as compared to data from previous flights in the Fall. Seasonal changes in CO distribution are a key area of study in climate change.

The MAPS hardware consists of an optical box, an electronics box, a tape recorder, and a camera all mounted to a single base plate. This assembly is, in turn, mounted to a multipurpose experiment support structure (MPESS) located near the forward end of the Shuttle's cargo bay. The instrument is about 36 inches long, 30 inches wide, and 23 inches high. It weighs 203 lbs. and consumes about 125 watts of electrical power.

The MAPS instrument is based on a technique called gas filter radiometry. Thermal energy from the Earth passes through the atmosphere and enters the viewport of the down-looking MAPS instrument. Carbon monoxide (CO) and nitrous oxide (N_2O) in the atmosphere produce unique absorption lines in the transmitted thermal energy. The energy which enters the MAPS instrument is split into three beams. One beam passes through a cell containing CO and falls onto a detector.

This CO gas cell acts as a filter for the effects of CO present in the middle troposphere. A second beam falls directly onto a detector without passing through any gas filter. The difference in the voltage of the signals from these two detectors can be used to determine the amount of CO present in the atmosphere at an altitude of 7-8 km. A third beam of the incident energy passes through a cell containing the N_2O and falls onto a detector. The difference in the voltage of this detector and the second detector can be used to determine the amount of N_2O in the atmosphere. This N_2O gas cell acts as a filter for the effects of N_2O present in the atmosphere. The global distribution of the N_2O is well known, so the N_2O signal can be used to detect the presence of clouds in the field of view and to correct the simultaneous CO measurement for

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systematic errors in the data.

The Principal Investigator for MAPS is Dr. Henry G. Reichle, Jr. and the Project Manager is Mr. John Fedors; both are from the NASA Langley Research Center. The experiment is guided by a Science Team whose members are Dr. V. Connors, NASA Langley Research Center; Mr. W. Hesketh, SpaceTec, Inc.; Dr. P. Kasibhatla, Georgia Institute of Technology; Dr. V. Kirchhoff, INPE, Brazil; Dr. J. Logan, Harvard University; Dr. R. Newell, Massachusetts Institute of Technology; Dr. R. Nicholls, York University, Canada; Dr. L. Peters, Virginia Polytechnic Institute and State University; Dr. W. Seiler, IFU, Germany; and Mr. H. Wallio, NASA Langley Research Center.

Leading the STS-59 crew are mission commander Sidney M. Gutierrez, pilot Kevin P. Chilton, and four mission specialists, Linda M. Godwin, Jerome Apt, Michael R. Clifford and Thomas D. Jones. Endeavour is scheduled to land at Kennedy Space Center on April 16 at 1:14 p.m. ET.

A payload partner on this mission is the Space Radar Laboratory (SRL). It will have the ability to make surface measurements over virtually any region on Earth at any time, regardless of weather or sunlight conditions. In many cases, radar is the only way scientists can explore inaccessible regions on the Earth's surface.

The launch and landing will be telecast over NASA's satellite television network from Kennedy Space Center in Florida and can be seen at the NASA Langley News Center, 3. S. Wright Street. Media who would like to cover these events should call the NASA Langley Public Affairs Office weekdays at 804/864-6122.

-End-

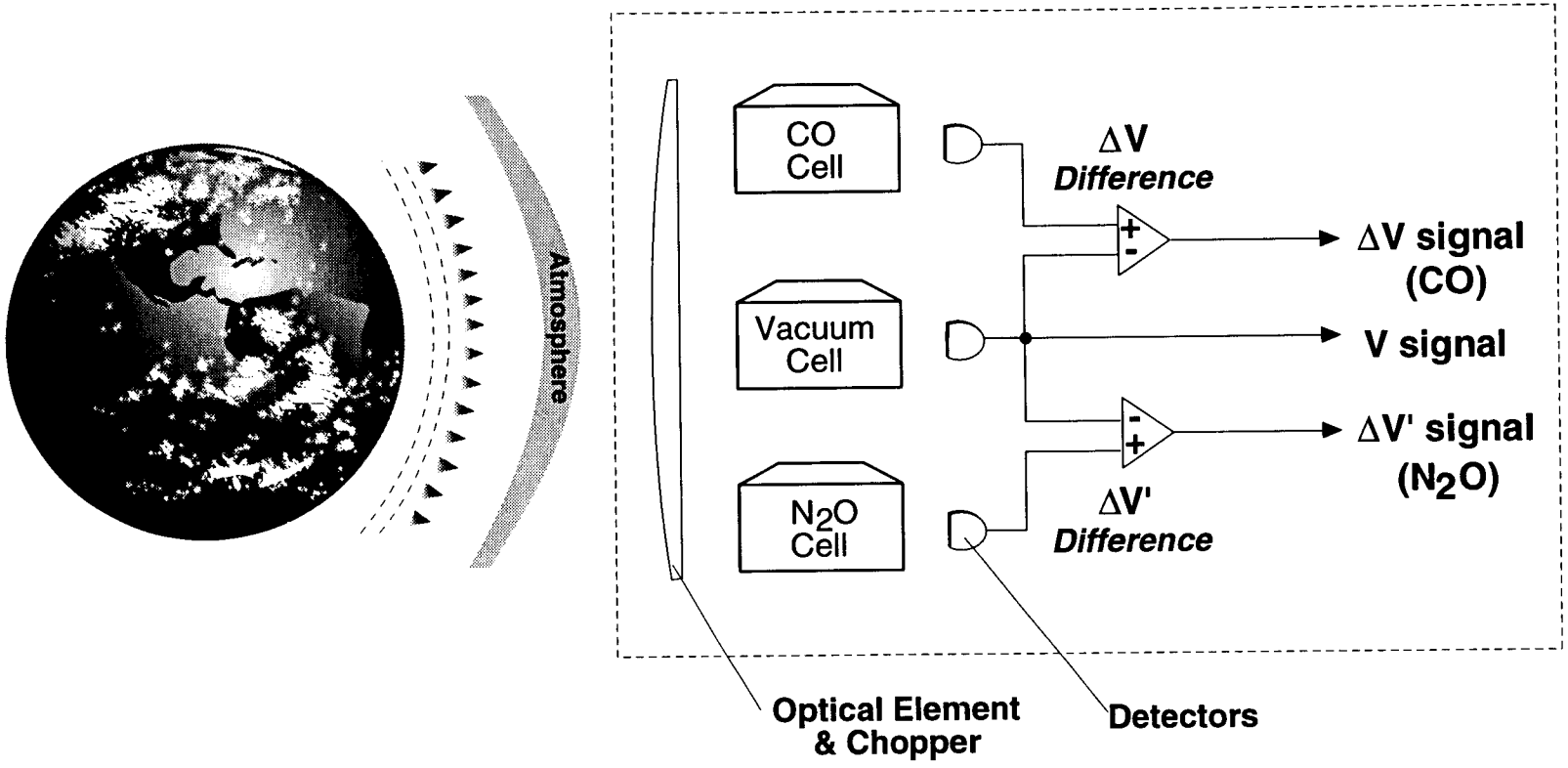
Note to Editors:

Attachment: Black and white graphic.

Photos of the crew taken during a training session are available upon request. Request Photo No. L-93-08945, and state whether black and white or color is needed.

The following materials are available upon request: STS-59 press kit, MAPS brochures, photo of astronaut crew.

Measurement of Air Pollution from Satellites (MAPS)



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For Release:

RELEASE NO. 94-027

LANGLEY STORY OPPORTUNITIES -- APRIL 1994

EDUCATORS LIFT OFF. The human calculator, Scott Flansburg, will be one of many experts who will speak at the 27th annual National Conference on Aviation and Space Education. More than 1,000 educators nationwide will meet April 6-9 in Norfolk, Va., to expand their knowledge of aviation and space and to take hands-on learning back to their classrooms. This conference is sponsored by NASA, the Civil Air Patrol and the Federal Aviation Administration. Interviews available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

SHUTTLE MISSION STS-59 WILL STUDY CHANGING GLOBAL ENVIRONMENT:

ENVIRONMENTAL CHANGE & SPACE SCIENCE FOR KIDS. Shuttle Endeavour will lift off April 7 at 8:07 a.m. EDT, carrying a Space Radar Laboratory (SRL). The SRL will provide detailed information to help distinguish between human-induced and natural forms of environmental change. The mission also includes three NASA Get Away Special experiments, which give students a chance to contribute in-space experiments to a Shuttle mission. Landing scheduled for April 16 at 1:14 p.m EDT at Kennedy Space Center.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

LANGLEY'S 'MAPS' GIVES DIRECTION TO ATMOSPHERIC STUDY. The April 7 Shuttle mission will carry a Langley instrument designed to study the connection, if any, between carbon monoxide and atmospheric warming. The MAPS instrument will measure the distribution of carbon monoxide in the lower atmosphere for clues to how changes in the amount of the pollutant affect the atmosphere's ability to clean itself of trace gases that can increase the atmosphere's temperature. MAPS is short for Measurement of Air Pollution from Satellites. Interviews and video available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

- more -

APRIL COLLOQUIUM: 'CONCEPT OF THE HELICOPTER.' Igor Sikorsky's early days in aviation, including his development of the first practical helicopter, will be described by his son, Sergei I. Sikorsky, at NASA Langley's April 12 Colloquium at 10 a.m. Location is NASA's H.J.E. Reid Conference Center, 14 Langley Blvd. Press briefing at 9:15 a.m. A less technical lecture, free and open to the public, will be presented at the Virginia Air & Space Center (VASC), Hampton, Va., on April 11 at 7:30 p.m. The second lecture is a part of the VASC-Daily Press-NASA Sigma Series.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122

HIGH LIFT BENEFITS ARE MANY. Smaller wings with less complex flap systems are just two of the many benefits expected to flow from NASA Langley's 'high-lift' flight tests set to resume in April. NASA's 737 has been outfitted with thousands of sensors in its wing for a microscopic look at how air flows over a wing. Results will be shared with U.S. industry for design of less expensive, energy-efficient aircraft. Interviews and photo opportunities available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

FINAL LAUNCH FOR "SCOUT." Langley played a major role in the development and management of the Scout rocket, called the "unsung hero of space." The Scout rocket will fly its 118th and final mission on April 19 from Vandenberg Air Force Base, Calif. Scout, the first solid rocket to propel a payload into orbit, will be ending a 34-year career as one of NASA's most reliable expendable launch vehicles. On this mission, Scout will launch an atmospheric studies satellite for the Ballistic Missile Defense Organization. Scout was manufactured by Loral Vought Systems in Dallas, Texas. Interviews, video documentary and background information available.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-6122
LORAL PUBLIC RELATIONS CONTACT: Craig Vanbebber (214) 603-1615

PHOTO OPPORTUNITY:

NASA 757 ARRIVAL. Langley's newly acquired Boeing 757-200 is expected to arrive at Langley mid-to-late April. Langley will then begin the extensive process of converting the jet airliner into a premier flying laboratory for a broad range of aeronautical research.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

COMING IN MAY:

NASA 737 OBSERVANCE. Langley will mark the 20-year research career of NASA Langley's Boeing 737 on May 17 with the unveiling of a new painting at Virginia Air & Space Center and a book which chronicles its history of technology transfer between NASA and industry.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

- end -

NASA News

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RELEASE NO. 94-033

For Release:

LANGLEY STORY OPPORTUNITIES -- MAY 1994

PAINTING UNVEILING TO MARK AIRCRAFT'S 20th. A painting of NASA Langley's 737 'flying laboratory' will be the guest of honor at the aircraft's 20th anniversary celebration at the Virginia Air and Space Center, May 17. The painting is a dramatic look into the demanding and dangerous flight tests performed through lightning, turbulence and heavy rains. Entitled, "The Wind Shear Flight Tests," it was painted by internationally-known aerospace artist John Clark through the NASA Art Program. On May 17, 1974, the NASA 515--Boeing's very first 737--arrived at Langley to begin a rich and varied research career that has lasted two decades. Recent 737 contributions range from helping prove the potential of global positioning system (GPS) satellite navigation to airborne windshear detection sensors.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

NEW AERONAUTICS BOOK. A new book joins the prestigious "NASA History Series" later this month: Airborne Trailblazer: Two Decades with NASA Langley's Boeing 737 Flying Laboratory. Airborne Trailblazer is an illustrated history of Langley's 737 and its role in transferring aviation technology to the research and development community, the aerospace industry and the public. Aviation author Lane Wallace colorfully describes the interplay and debates among pilots, scientists, engineers and managers, bringing to light some of the more important case studies in American aerospace research.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

FINAL LAUNCH FOR 'SCOUT' IN EARLY MAY. The last "Scout" rocket is scheduled to be launched in early May, marking the end of a career that began in 1960. This will be Scout's 118th and final mission. NASA Langley played a major role in the development and management of the Scout rocket, once called the "Unsung Hero of Space." Scout was manufactured by Loral Vought Systems in Dallas, Texas. Interviews, video and background information available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4
LORAL PUBLIC RELATIONS CONTACT: Craig Vanbebber (214) 603-1615

BALLOON TO SEARCH FOR OZONE KILLER. A giant helium-filled balloon will lift a 1.5 ton instrument to heights of 25 miles above New Mexico to locate and measure ozone-depleting gas. Launch window opens May 15. This instrument will search the atmosphere for traces of an agricultural chemical called "bromine," which is used to kill pests and weeds that attack crops. Scientists speculate that this gas is causing further depletion of the ozone layer. The international research effort includes participants from Italy, the United Kingdom, NASA Langley and the NASA Jet Propulsion Laboratory. Interview available.
PUBLIC AFFAIRS CONTACT: Allison Ballew (804) 864-8150

- more -

'MAPS' PROVIDES NEW ATMOSPHERIC IMAGES. A Langley experiment spent more than 10 days in space on a recent shuttle mission, obtaining new images that show how carbon monoxide is distributed in the lower atmosphere around the globe. The measurements obtained by MAPS (Measurement of Air Pollution from Satellites) have been studied by a group of scientists representing 16 countries. When complete, their work will shed new light on the chemistry of the lower atmosphere for each of the four seasons. Color computer image available mid-May. Interview available.
PUBLIC AFFAIRS CONTACT: (804) 864-6124

TALK TO ADVISE ON ROLLERCOASTER RIDE. How pilots unknowingly cause an otherwise stable plane to fly unevenly will be the topic of NASA's May 19 colloquium at 2 p.m. The chairman of Systems Technology, Inc., Duane McRuer, will discuss "Pilot-Induced Oscillation," which occurs when a pilot overcontrols a plane's natural stability, causing a rollercoaster flight path. Video of planes forced into this dangerous up-and-down flight path will be shown. Location is the H.J.E. Reid Conference Center, 14 Langley Blvd. Press conference at 1:15 p.m., May 19.
PUBLIC AFFAIRS CONTACT: Allison Ballew (804) 864-8150

'INGREDIENTS FOR A RENAISSANCE.' New aviation technology, recruiting potential pilots, and developing valuable aerospace products are among the topics for the general aviation symposium at the National Air and Space Museum, Washington, D.C., May 19. Langley is the Agency's lead for the advanced subsonic technology program. Dr. Bruce Holmes of NASA Langley will deliver the opening technical address on the subject of "Advances in Cockpit Technologies." Interview, photos available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

AIRCRAFT PHOTO OPPORTUNITIES:

757 ARRIVAL. The newly-acquired Boeing 757 is expected to arrive at NASA Langley early-May. This 2nd generation "flying laboratory" has been modified extensively for a broad range of flight research programs to benefit the U.S. aviation industry and commercial airline customers. The 757 will continue the work begun by the NASA 737 in state-of-the-art technologies such as electronic cockpit displays, flight management systems and flight safety devices.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

FAMILY PORTRAIT. Both the veteran 737 and the new 757 testbed aircraft will be positioned in front of the NASA Langley hangar. Call for date and time.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

LIZARD SHEDS ITS SKIN. OV-10 "Broncos" normally serve as military observer aircraft. NASA's recently-acquired OV-10 aircraft will return to the center in early May, having shed its "lizard-scheme" camouflage paint job, sporting a new high-visibility paint job which will assist in optical tracking. Research to be performed with this unusual looking twin-engine, twin-boom aircraft will support Langley's wake vortex program, designed to improve airport efficiency and safety. Paint job provided by Naval Aviation Depot, Marine Corps Air Station, Cherry Point, N.C.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120/4

- end -

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For Release:
May 6, 1994

RELEASE: 94-036

SCOUT LAUNCH VEHICLE TO RETIRE AFTER 34 YEARS OF SERVICE

NASA has rescheduled the 118th and final flight of the Solid Controlled Orbital Utility Test (SCOUT) launch vehicle for Saturday, May 7, from the Western Test Range, Vandenberg Air Force Base, Lompoc, Calif. The 10-minute launch window opens at 10:45 p.m. EDT.

SCOUT has been a reliable rocket for nearly 34 years, flying its first mission on July 1, 1960, and becoming one of NASA's most successful launch vehicles. SCOUT's reliability for the last 26 years has been 98.3 percent and, since 1976, its launch success rate has been 100 percent. According to project officials, this reliability can be traced to its use of standardized launch and manufacturing procedures and the incorporation of off-the-shelf technology.

Although it is the smallest NASA launch vehicle capable of orbiting satellites, SCOUT has been a real workhorse for the space agency. Due to its extensive contributions to the space program and the limited publicity it has received, SCOUT has been called, "the unsung hero of space."

The SCOUT program was managed from 1958 through Dec. 1990 by NASA's Langley Research Center, Hampton, Va. Program management was transferred to NASA's Goddard Space Flight Center, Greenbelt, Md., in Jan. 1991.

The last SCOUT will launch a Miniature Sensor Technology Integration (MSTI) satellite. The satellite, designated MSTI-2, will conduct tracking and Earth-observation experiments. Designed and built by Phillips Laboratory at Edwards Air Force Base, Calif., the MSTI program is in support of the Ballistic Missile Defense Organization's Theater Missile Defense Directive. A SCOUT launch vehicle launched the first MSTI satellite in Nov. 1992.

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This launch vehicle had its beginnings as early as 1957. The U. S. needed a relatively inexpensive, quickly produced rocket to launch small research experiments, and Langley engineers were asked to design it. Their goal was to provide a launch vehicle capable of performing a variety of probe, re-entry and orbital missions with minimum preparation time.

The conception was complete in 1958, and Chance Vought Aircraft (now Loral Vought Systems) was placed under contract in March 1959 to build SCOUT vehicles. This was the beginning of a government/contractor relationship which has lasted more than 35 years.

SCOUT was America's first solid-fuel launch vehicle capable oforbiting a satellite. The standard SCOUT launch vehicle is a solid-propellant, four-stage booster system, approximately 75 feet (23 meters) long with a launch weight of 47,398 pounds (21,500 kilograms).

Unlike most of NASA's larger expendable rockets, the SCOUT isassembled and the payload is integrated and checked-out in the horizontal position prior to launch. SCOUT's first-stage motor was based on an earlier version of the Navy's Polaris missile motor. The second-stage motor was developed from the Army's Sergeant surface-to-surface missile, and the third- and fourth-stage motors were adapted by Langley from the Navy's Vanguard missile.

The first SCOUT was launched from Goddard's Wallops Flight Facility, Wallops Island, Va., on July 1, 1960. The rocket carried a 193-pound (88-kilogram) payload as a probe test. On February 16, 1961, Scout became the first solid-fuel rocket to place a payload into orbit. The vehicle carried a 96-pound (44-kilogram) NASA atmospheric physics payload into orbit without incident.

Two launch sites were added in subsequent years. One, at the Western Test Range at Vandenberg Air Force Base, was added in 1962. Another was built on Italy's unique sea-based San Marco platform off the east coast of Kenya, Africa, the site of nine successful equatorial missions since 1967.

SCOUT capability grew dramatically over the years. Originally able to place a 131-pound (59-kilogram) payload in a nominal 345-mile (552-kilometer) circular orbit, SCOUT performance was improved, increasing its capability to put a 458-pound (208-kilogram) payload into the same orbit. The heaviest satellite ever placed in orbit by SCOUT was an Italian payload that weighed more than 600 pounds (270 kilograms) and was launched out of Africa. SCOUT increased its load-carrying capability 350 percent over that of the original vehicle with little increase in the size of its stages.

The SCOUT program has made possible important contributions to knowledge of space, not only for the U. S. but also for a number of foreign nations, including Italy, Great Britain, Germany, France, the Netherlands and the multi-national European Space Agency. These contributions have been in navigation, astronomy, geodesy, meteoroid environment, re-entry materials, biology, spacecraft technology and applications.

To commemorate SCOUT's contributions to the American space program, there is a SCOUT rocket on display in the Smithsonian Institution's National Air and Space Museum, Washington, D.C.

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For Release:

May 9, 1994

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Release No. 93-037

NATIONAL FACILITIES INVENTORIED, NEEDS ESTABLISHED

A National Facilities Study released today indicates the need for two new wind tunnels and provides 70 recommendations affecting aeronautics and space facilities nationwide.

Conducted by representatives from NASA and the Departments of Commerce, Defense, Energy and Transportation, the study identifies federal government and industry facility shortfalls and recommends new facility requirements, consolidation opportunities and closures.

"Shaping our national facilities to best meet our country's needs should be a continuous process and this study is the first step," said NASA Administrator Daniel S. Goldin. "We should capitalize on this to improve our plans for using these national resources."

The recommendations endorsed by the National Facilities Study Team have been submitted for review to the participating agencies. Cost savings, if implemented, are estimated at $114 million annually. Some of these savings already are reflected in agency budget submissions.

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One finding of the study is that aerospace facility inventories were incomplete and outdated. The study also provides the first comprehensive, computerized database of U.S. aeronautics and space facilities. Potentially, this can be used to evaluate existing facilities before construction of a new facility is considered. The inventory data now include facility characteristics, performance features, an estimate of usage and contact points for additional information. The computerized database contains over 2,800 facilities and is still growing, as additional government and industrial organizations provide information.

Cited as the most critical among the new needs is the development of two wind tunnels for testing future commercial jet transports. These tunnels -- one subsonic and one transonic -- would provide a combination of flight condition simulation and testing efficiency unmatched in the world. The study recommends the tunnels should be operating by the year 2002 to provide the U.S. with the competitive edge needed for the next round of wide-body commercial transport competition.

Additionally, the study indicates that a new supersonic facility should not be constructed at this time. However, an investment to bring existing civil and defense facilities up to the productivity standards needed for commercial product development is recommended. The study also calls for a research plan on hypersonic facilities to be conducted by NASA, DoD and industry. Forty-four major government wind tunnels were reviewed for consolidation and closure.

A future mission and requirements model was developed as a key tool for assessing future aerospace facility requirements. A projection of future space mission requirements embraces military and civilian government and commercial sectors to help determine what type of facilities will be needed. Projections were extended for 30 years because of the long lead time inherent in facility development.

The study began in November 1992, when Administrator Goldin initiated a comprehensive and long-term plan for future aerospace facilities, to be accomplished in partnership with other government agencies and industry. The National Facilities Study has been submitted to the National Performance Review being conducted by Vice President Albert Gore, Jr., in response to the following directive: "NASA should work aggressively with its interagency counterparts to complete a summary report to the administration, by June 1994, identifying federal aerospace facility shortfalls, new facility requirements, consolidation opportunities and recommendations for closing."

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NOTE TO EDITORS: To obtain a copy of the National Facilities Study Summary Report, a list of wind tunnels recommended for closure and the status of facility consolidations, please FAX your request to the NASA Headquarters Newsroom at 202/358-4210 or 4335. Copies of this information also are available at all NASA Centers nationwide.

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release:

RELEASE NO. 94-056

LANGLEY STORY OPPORTUNITIES -- JUNE 1994

MARSVILLE: THE COSMIC ADVENTURE. On June 3, close to 200 middle school students and educators will experience life on Mars. After months of designing and building models of systems crucial to successful human settlement on Mars, teams of students from different schools will "settle" at NASA Langley Research Center's H.J.E. Reid Conference Center, 14 Langley Blvd. Here, they will build, inflate and decorate one full-size, plastic city "bubble" to simulate life on Mars. The program was adopted by the Education Committee of the Space Agency Forum for the International Space Year.
CONTACT: Pete Thomas (804) 864-3117

POCKET FULL OF STATS. The 1994 NASA Pocket statistics booklet places a wealth of NASA information at your fingertips. It contains a summary of all NASA launches from Mercury and Apollo to shuttle, a listing of shuttle payloads and experiments, tidbits on the solar system and data on NASA's budgets and manpower. News media may request a copy via fax. (804) 864-6333

JUNE COLLOQUIUM: AIR POWER FROM D-DAY TO TODAY. From propeller-driven fighters to present-day cruise missiles, fighter ace Col. George Doersch will explore the progressive growth of U.S. air power at NASA Langley's June 14 colloquium at 2 p.m. Col. Doersch's career spanned air combat over Europe during WWII in P-47 and P-51 fighters to ballistic and cruise missle deployments to Europe in the 1960's. Location is the H.J.E. Reid Conference Center, 14 Langley Blvd. Press conference at 1:15 p.m.
PUBLIC AFFAIRS CONTACT: Allison Ballew (804) 864-8150

- more -

NEW BOOK HIGHLIGHTS TECH TRANSFER IN THE AIR. A new book has joined the prestigious "NASA History Series." Airborne Trailblazer: Two Decades with NASA Langley's 737 Flying Laboratory is an illustrated history of Langley's 737 and its role in transferring technology to the research and development community, the aerospace industry and the public. Author Lane Wallace brings to light important case studies in American aerospace research. Airborne Trailblazer (publication number NASA SP-4216) is scheduled to go on sale later in June. Call Government Printing Office order desk at (202) 783-3238 to purchase a copy.
PUBLIC AFFAIRS CONTACT: Cam Martin (804) 864-6121
NOTE TO BOOK REVIEWERS: Limited number of Airborne Trailblazer available for book reviews. Write or fax on institution letterhead. NASA LaRC FAX (804) 864-6333.

JULY ITEMS FOR YOUR EDITORIAL CALENDAR:

PUBLIC AFFAIRS CONTACT: Allison Ballew (804) 864-8150

SPACEWEEK '94. The 25th anniversary of Apollo 11, the mission that first landed a spacecraft on the moon, will lead the celebration of this year's National Space Week, July 16-24. "Spirt of Yesterday - Vision for Tomorrow" is the theme for this space-tacular event. Included is a model rocket launch, sponsored by the National Space Society. Commemorative Apollo poster is available for a nominal fee by calling (713) 333-3627.
NATIONAL SPACE SOCIETY PHONE NUMBER: (713) 333-3627

APOLLO OPEN HOUSE. NASA Langley will host several events during National Space Week, July 16-24, including an open house in the historic areas that supported the Apollo mission. Details for open house to be announced.

JULY COLLOQUIUM. On July 20, John Houbolt, a key player in the drive to put a man on the moon, will speak at NASA Langley on development of the technique used in the Apollo lunar landing on July 20, 1969. A similar presentation will be held that evening at the Virginia Air and Space Center.

ON THE HORIZON:

'LITE' LAUNCH COMING IN SEPTEMBER. Langley has built a specialized laser sensor (called a lidar) which will fly in space for the first time this September on the space shuttle Discovery. The purpose of the mission is to demonstrate how lasers can be used as research tools in space and how they can help scientists to understand the complex factors which control the earth's weather and climate. "LITE" (Lidar In-space Technology Experiment) will be the first civilian lidar in space. Lidar is the laser equivalent to radar.

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Apollo 11 25 1969-1994
The Eagle Has Landed

For Release:

Catharine G. Schauer
Work: 804/864-6122
Home: 804/898-8463

June 3, 1994

RELEASE: 94-057

NOTE TO EDITORS: The following information is intended for your publication's calendar of events and for your information as you plan stories for National Space Week, July 16-24, 1994. Specific details will be provided to you later this month.

NASA Langley Open House Scheduled for July 16

NASA Langley Research Center, Hampton, Va., invites the public to an Open House July 16, 1994, from 9 a.m. to 4 p.m. The Open House is in recognition of the 25th anniversary of the Apollo 11 Lunar landing -- perhaps the most impressive achievement in modern history -- when man took his first steps on the moon July 20, 1969.

The Open House will feature key facilities at the Center, including the historic areas that supported the Apollo mission. Exhibits and demonstrations will highlight current research technology and its application to industry.

The event is free.

For information about this event, call Bert Rockey at 804/864-6850.

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Allison Ballew
(804) 864-8150
(804) 464-3711 (evenings)

For Release:
June 21, 1994

RELEASE NO. 94-058

NEW BOOK HIGHLIGHTS HIGH-FLYING TECH TRANSFER

AIRBORNE TRAILBLAZER: TWO DECADES WITH NASA LANGLEY'S 737 FLYING LABORATORY
NASA SP-4216

A new, picture-packed book has joined the ranks of the prestigious "NASA History Series." In *Airborne Trailblazer: Two Decades with NASA Langley's 737 Flying Laboratory*, author Lane Wallace not only tells the history behind this able-bodied research plane, but also explores the creative methods of technology transfer which the 737 made possible during its twenty-year career at NASA Langley.

In the book, Wallace recounts and explodes several "technology transfer myths." One of these myths is that new technology is automatically used the moment it is received by industry; another is that "better mousetraps" are always recognized. The transfer of technology from government research institutions, like NASA, to industry is a complex process influenced by many factors. These issues are discussed by the author in the form of case studies.

Since 1974, the Langley 737 aircraft has been a testbed for research, including aircraft safety, efficiency and reliability. Among the major research efforts described in this 185-page book is the aircraft's valuable contribution to developing and testing detection systems for microburst windshear, a weather phenomenon particularly hazardous to aircraft approaching a runway.

- more -

"This book is a welcome addition to the NASA History Series," NASA's Chief Historian Roger Launius said. "The author uses the 'biography' of an airplane to ponder much larger questions about the expansion of aviation technology and its transfer to those who can apply it."

Wallace describes how the research conducted by Langley's 737 was instrumental in Boeing's 1978 decision to include electronic flight displays in the cockpits of the new 757 and 767, thus discarding the predominant systems. The book also describes the 737's numerous other research advances, including the more recent successful flight tests of the Global Positioning System, where satellites provide navigational guidance to aircraft.

Wallace is a professional aviation writer who has published over 200 articles on aviation and aerospace topics. Her writing includes subjects ranging from biplanes and air racing to new developments in NASA research and military aircraft technology. Wallace graduated with honors from Brown University in 1983, with a degree in semiotics (the study of signs and symbols and their function in languages). She flies her own airplane, a 1946 Cessna 120.

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NOTE TO BOOK REVIEWERS: *There are a limited number of Airborne Trailblazer books available for book reviews. Write or fax on your institution's letterhead. NASA LaRC FAX (804) 864-6333/8199.*

ORDER INFORMATION: *Airborne Trailblazer can be ordered by mail from the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954, by fax at (202) 512-2250, or by telephone from the Government Printing Office order desk at (202) 783-3238. Reference GPO stock number 033-000-01140-7. GPO price, $27.00*

NOTE: *The following photos are available to accompany this release by calling Allison Ballew at (804) 864-8150.*

L-94-2071 -- Book cover
L-94-02148 -- Author Lane Wallace
L-93-11003 -- NASA Art Collection windshear painting by John Clark
L-93-9784 -- 737 sideview Boeing roll-out markings, 1967
L-93-9783 -- 737 sideview NASA Langley markings, 1974
L-93-9782 -- 737 sideview NASA Langley markings, 1989

NASA News

National Aeronautics and
Space Administration

Langley Research Center
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Drucella Andersen
Headquarters, Washington, D.C.
(Phone: 202/358-4733)

H. Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6120)

For Release:
June 24,1994

RELEASE NO. 94-061

NASA NEGOTIATES AERO CONTRACTS WITH BOEING/DOUGLAS

NASA has selected Boeing Commericial Airplane Group, Seattle, Wash., and McDonnell Douglas Aerospace, Long Beach, Calif., for negotiation of contracts estimated at $62 million to develop technologies in support of the Advanced Subsonic Technology Program.

Under the potential five-year contracts to be managed by NASA's Langley Research Center, Hampton, Va., Boeing and Douglas will develop better wing design methods leading to improved aircraft performance and reduced design cycle time and cost.

Under the Advanced Subsonic Technology program, NASA is developing technology to make present and future generations of American subsonic aircraft environmentally compatible, economical and competitive with foreign products.

-end-

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Apollo 11 25 1969-1994 The Eagle Has Landed

Kirsten Williams
(804) 864-6527

For Release:
June 20, 1994

RELEASE NO. 94-063

TWENTY-FIFTH ANNIVERSARY OF FIRST LUNAR LANDING: LANGLEY'S CONTRIBUTIONS TO THE APOLLO PROGRAM

Twenty-five years after the first manned landing on the moon, President Kennedy's commitment to the lunar mission sounds as bold as it ever did: American astronauts should fly a quarter of a million miles, make a pinpoint landing on a strange planet, blast off it and return home safely after an eight-day voyage through space. When Kennedy challenged the nation to risk this incredible journey, the only United States manned spaceflight up to that time had been Alan B. Shepard's 15-minute suborbital excursion in Mercury capsule, Freedom 7. NASA was not exactly sure how the lunar mission should be made at all, let alone achieved in less than ten years' time.

Answering President Kennedy's challenge and landing men on the moon by 1969 required the most sudden burst of technological creativity, and the largest commitment of resources ($24 billion), ever made by any nation in peacetime. At its peak the Apollo program employed 400,000 Americans and required the support of over 20,000 industrial firms and universities.

On the occasion of the twenty-fifth anniversary of the first manned lunar landing, made July 20, 1969, by Apollo 11 astronauts Neil A. Armstrong, commander; Michael Collins, Command Module pilot; and Edwin E. "Buzz" Aldrin, Lunar Module pilot, this release pays tribute to the contributions to Apollo made by NASA's Langley Research Center.

BACKGROUND

The Langley Research Center, established in 1917, was the first U.S. national laboratory devoted to the advancement of the science of flight. Long before the space program,

-more-

scientists and engineers at Langley incubated the ideas and hatched the technology that made American aviation take off and fly. For over 75 years now, information from the laboratory's wind tunnels and other unique research facilities has played a vital role in advancing American performance in the air.

Langley gave birth to key components of the U.S. space program. As early as 1952, Langley researchers explored seriously the possibilities of manned flight into space. Out of these pioneering studies grew the NASA Space Task Group that conceived and directed Project Mercury, America's original man-in-space program. Langley provided much of the knowledge and know-how basic to the development of the Mercury spacecraft and its related systems, as well as to the creation of the worldwide tracking network that monitored the first space shots. Furthermore, it was at Langley where the original team of NASA astronauts (Alan Shepard, Virgil "Gus" Grissom, John Glenn, Scott Carpenter, Donald "Deke" Slayton, Walter Schirra and Gordon Cooper) received their basic training.

HOW TO GET TO THE MOON?

When President Kennedy made his historic decision in May 1961, NASA had already studied various ways by which to land men on the moon but the agency was still uncertain which one was best. Mission planners quickly narrowed the options down to three: direct ascent, Earth-orbit rendezvous (EOR) and lunar-orbit rendezvous (LOR).

Of the three, LOR was initially the least popular inside of NASA due to what was then considered its greater complexity and risks.

In July 1962, however, after months of evaluation and intense debate, NASA selected LOR as the primary mission mode by which to land Americans on the moon "before the decade is out." Direct ascent, the first choice of many NASA officials, was ruled out because the huge new launch vehicle required to accomplish the mission--the proposed Nova rocket--would take too much time to develop. The EOR concept was ruled out because it required two separate launch vehicles.

NASA selected LOR only after Langley researchers proved the feasibility of rendezvous in space and revealed the important engineering and economic advantages of a manned moon landing through lunar-orbit rendezvous. Advocates of LOR at Langley played vital roles in convincing NASA leadership that LOR was not only as safe as either direct ascent and Earth-orbit rendezvous but also it promised mission success some months earlier.

LUNAR-ORBIT RENDEZVOUS (LOR) CONCEPT

The brainchild of a few true believers at NASA Langley who had been experimenting with the idea since 1959, the basic premise of LOR was to fire an assembly of three spacecraft into Earth orbit on top of a single powerful rocket (Saturn V). This assembly would include: one, a mother ship or command module (CM); two, a service module (SM) containing the fuel cells, attitude control system and main engine; and, three, a small lunar lander or excursion module. Once in Earth orbit, the last stage of the rocket would fire, boosting the combined Apollo spacecraft into its flight trajectory to the moon. In lunar orbit, two crew members would don space suits and climb into the lunar excursion module (LEM), and take it down to the surface. The third crew member would maintain a lonely vigil in lunar orbit inside the mother ship. After exploring, the LEM would rocket back up and re-dock with the CM. The lander would then be discarded to the vastness of space or crashed into the moon, and the three astronauts in their command ship would head for home.

Langley's bold plan for rendezvous in lunar orbit held out the promise of achieving a manned landing on the moon by 1969, but it presented many technical difficulties. Success depended on NASA's ability to train astronauts to master the techniques of landing the LEM on the lunar surface and returning it to orbit and docking with the mother ship.

Several of the most significant facilities used to develop techniques for LOR and prepare the astronauts for Apollo missions were designed, built and operated by the Langley Research Center.

RENDEZVOUS DOCKING SIMULATOR

One of the trickiest yet most essential maneuvers that had to be perfected on the ground before it could be tried in space was the linking of the lunar excursion module and the command module. The ability to rendezvous and dock the two vehicles in space was critical to the success of LOR, because if there were a failure the two astronauts in the LEM would have no means to return to Earth--and NASA would have no means to rescue them. The first men on the moon, international heroes, would die inside the LEM, and the commander of the CM would be forced to leave his buddies in their orbiting coffin and head for home alone. Nothing was secretly more terrifying to the CM commander than this possibility.

NASA had to do everything it could to make sure that this tragedy did not happen.

In the early 1960s, Langley researchers built various simulators to study the feasibility of space rendezvous and orbital docking. The most advanced of these, the Rendezvous

Docking Simulator, significantly improved the chances of mission sucess through LOR by giving the astronauts a routine opportunity to pilot dynamically-controlled scale-model vehicles in a safe and controlled three-dimensional environment closely approximating that of space.

Rendezvous in space could turn sour with paralyzing swiftness. An on-board computer might fail, a gyroscope might tilt the wrong way, or some other glitch might occur to complicate the performance of a necessary maneuver. Pilots of both the LEM and the CM had to be ready to make crucial decisions instantaneously. Without Langley's Rendezvous Docking Simulator, the astronauts would not have been nearly as well prepared for handling the pressures of LOR. With the help of this ingenious device, they were able to master all of the necessary rendezvous and docking skills before liftoff.

LUNAR LANDING RESEARCH FACILITY

Before confronting the serious challenges of rendezvous and docking, the goal of the Apollo astronauts was first to achieve a successful lunar landing. To help solve this part of the overall problem of an LOR mission, Langley engineers constructed the Lunar Landing Research Facility.

NASA needed such a facility in order to explore and develop techniques for landing the rocket-powered LEM on the moon's surface, where the gravity is only one-sixth as strong as on Earth, as well as to determine the limits of human piloting capabilities in the unknown flight medium.

Although NASA Langley did use helicopters in the early 1960s to ascertain some of the problems of vertical descent to a lunar landing, there were no direct parallels between flying an aircraft in the Earth's atmosphere and piloting the LEM in the vacuum of space. If there had been parallels, the LEM would have looked something like a conventional aircraft -- which it absolutely did not.

Langley researchers, because they were the early champions of LOR inside of NASA, played the leading role in the original conceptualization of the lunar excursion module. They knew that the pilot of this vehicle, however its final design turned out, would have to overcome some distinctly unusual problems.

In technical terms, control of the LEM required small rockets that operated in an on-off manner. The firing of these control rockets in space produced abrupt changes in torques--forces that tended to produce rotation or rolling -- rather than the smoothly modulated torques of a helicopter.

Furthermore, the LEM would hover in space with only one-sixth of the thrust required

for a vehicle of the same weight in Earth's gravity. This meant that the characteristics of the LEM's control system would be significantly different from those of any flight vehicle to which the astronauts were accustomed. They could not simply extrapolate from atmospheric flight to flight in lunar conditions. In key respects, in fact, some of their basic previous experience in flying machines might even confuse them and get in their way.

Langley's Lunar Landing Research Facility, completed in 1965, helped to prepare the Apollo astronauts for the final 150 feet of their lunar landing mission by simulating both the lunar gravity environment and full-scale LEM vehicle dynamics. The builders of this unique facility effectively cancelled all but one-sixth of Earth's gravitational force by using an overhead partial-suspension system that provided a lifting force by means of cables acting through the LEM's center of gravity.

Twenty-four astronauts practiced lunar landings at this facility, the base of which was modeled with fill dirt to resemble the surface of the moon. Neil Armstrong and Buzz Aldrin trained on it for many hours before liftoff of Apollo 11. As was the case with all space missions, the successful landings of the first two men on the moon depended heavily on expert training in ground equipment like Langley's Rendezvous Docking Simulator and Lunar Landing Research Facility.

Langley provided critical information about the lunar landing in other ways as well. A hydraulic analog simulator built at the laboratory in the early 1960s helped researchers determine the ability of a pilot to control vertical braking maneuvers for landings starting from an altitude of about 25 miles above the lunar surface. There was also a special facility using one-sixth scale models of the LEM that looked into the possibility of an impact that could damage or upset the fragile-looking vehicle upon landing. Another laboratory apparatus probed the anticipated and much feared problem that blowing lunar dust caused by the blast of rocket engines might temporarily blind the pilot of the LEM during descent and prevent him from finding a safe spot for landing.

LUNAR ORBITER PROJECT

Through its management of the Lunar Orbiter Project, which involved systematic photography of the moon's surface by an unmanned spacecraft in lunar orbit, Langley also played a significant role in the selection of the sites of the Apollo manned landings.

Before NASA could give the go-ahead for a landing attempt, many details had to be learned about the nature of the destination. Although humankind had moved some distance from the fantasy that it was made of green cheese, there still existed all kinds of wild theories about the

moon. One theory said that its surface was covered by a fine layer of dust perhaps 50 feet thick; any type of vehicle attempting to land on it would sink and be buried as in quicksand.

Earth-bound telescopes could not resolve lunar objects smaller than a football stadium, so Apollo mission planners could hardly rely on them for a detailed picture of the lunar surface. To get this information, and separate fact from fancy, NASA in the mid-1960s sent a series of unmanned missions to the moon.

The first of these, Project Ranger, involved the hard landing of small probes equipped with a high-speed camera. Before crashing to their destruction into the moon's surface, the Ranger spacecraft showed that a lunar landing was possible--but definitely not just anywhere. The craters and big boulders had to be avoided.

The second probe, Project Surveyor, through its soft landings and photographic data, showed that the lunar surface could easily support the weight and the impact of a small lander.

The third probe, the Lunar Orbiter Project, made photographic maps of the moon's equatorial regions. These maps, compiled at Langley, provided NASA with the detailed topographical information needed to pinpoint the best landing sites -- including the exact spot in the Sea of Tranquility chosen for Apollo 11.

EXTRAVEHICULAR ACTIVITY

Along with comprehensive studies of astronaut capabilities and mobility in space both inside a spacecraft and during "spacewalks," researchers at Langley also contributed significantly to NASA's understanding of what the Apollo astronauts would and would not be able to do while moving around on the lunar surface.

In the Reduced Gravity Simulator researchers investigated an astronaut's ability to walk, run and perform the other tasks required in lunar exploration activities. With this facility NASA studied the effects of one-sixth gravity on self-locomotion by suspending the subject on his side so that he was free to walk on a plane inclined to about 80.5 degrees relative to the local horizons. Holding up the lunar walker so he would not fall was a network of slings and cables. This was attached to a lightweight trolley that travelled freely along an overhead track that was part of the larger Lunar Landing Research Facility.

A number of the Apollo astronauts practiced lunar walking in Langley's Reduced Gravity Simulator.

AERODYNAMICS AND STRUCTURES RESEARCH

Many other things were done at Langley to support Apollo. Through hundreds of hours of wind-tunnel testing, researchers helped to determine the aerodynamic characteristics of the Apollo-Saturn launch configuration. In order to evaluate Apollo's ablative heat-shield materials, an electric arc heater was used at Langley that could duplicate the intense heat generated by friction during reentry. In numerous facilities, including the 8-Foot High -Temperature Tunnel, Langley engineers conducted critical investigations into the structural integrity of Apollo.

One of the major research projects managed by NASA Langley in support of Apollo was FIRE (Flight Investigation Reentry Environment). Although this project mainly consisted of flight tests involving Atlas rockets with recoverable reentry packages, FIRE also involved wind-tunnel testing. The purpose of the project was to study the effects of reentry heating on spacecraft materials.

From lunar orbiter tracking data, staff members constructed representations of the moon's gravitational field. These mathematical models proved invaluable in the design and timing of critical operating maneuvers during the flight of Apollo 11 and the subsequent lunar landing missions.

CONCLUSION

This discussion only summarizes the highpoints of Langley's contributions to the Apollo lunar landing and exploration program. As President Kennedy indicated, the entire nation would have to go to work if Americans were to set foot on the moon by the end of 1969. No place was more fortunate to participate in the achievement of the lunar objective than was the Langley Research Center.

NOTE TO EDITORS: The following photographs to accompany this release are available by calling the NASA Langley Research Center Public Affairs Office, 804-864-6124:

L-67-3179: Multiple-exposure showing simulated lunar landing of Lunar Excursion Module Simulator (LEMS) at NASA Langley

L-64-1609: Gemini Redezvous docking simulator at NASA Langley

L-89-361: NASA's "Orginal Seven" who trained at Langley for Project Mercury in space suits

L-71-2971: NASA's "Original Seven" in flight suits in front of fighter airplane

L-67-7231: Lunar Orbiter spacecraft that helped pick moon landing sites shown in NASA Langley laboratory

L-69-4850: Lunar Landing Facilitity showing Lunar Excursion Module Simulator and simulated moon surface

L-59-4946: Black and white photo of pre-Apollo Mercury capsules, tested at NASA's Wallops Station, Wallops Island, Va., under construction at Langley

L-89-3408: Astronaut Buzz Aldrin on lunar surface in space suit

L-62-8895: Black and white photo of Apollo reentry studied in NASA Langley wind tunnel

L-69-2199: Neil Armstrong with NASA Langley's Lunar Excursion Module Simulator

L-71-8904: Saturn-Apollo launch configuration in wind tunnel at NASA Langley

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

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Headquarters, Washington, D.C.
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Kirsten Williams
Langley Research Center, Hampton, Va.
(Phone: 804/864-6527)

For Release:

June 15, 1994

RELEASE: 94-064

NASA SELECTS HONEYWELL FOR $75 MILLION AERO CONTRACT

NASA's Langley Research Center, Hampton, Va. has selected a team led by Honeywell Inc., for an award of a $75 million, cost-reimbursement contract, including options, for the development of flight deck technologies in support of the agency's High Speed Research program.

The work, to be managed by NASA's Langley Research Center, Hampton, Va., will be conducted over eight yeras and will take place at the contractor's plants in Minneapolis, Minn., and Phoenix Ariz., and at selected sub-contractor locations.

Honeywell will support the development of technologies for advanced sensors and computer systems, guidance and control system concepts, and a next generation flight deck design for a potential future High Speed Civil Transport (HSCT). The commercial supersonic aircraft could fly 300 passengers across the Pacific or Atlantic Oceans at 2.4 times the speed of sound -- cutting travel time by more than half.

Synthetic forward visibility systems will be designed, developed and tested to allow the flight crew to operate in the absence of forward windows and in poor visibility conditions. The technologies also could provide greater route flexibility and decrease fuel consumption while increasing efficiency and safety. Researchers plan to integrate flight deck technologies within the cockpit and with the rest of the airframe and propulsion system.

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

RELEASE NO. 94-065

For Release:
June 21, 1994

APOLLO TWENTY-FIFTH ANNIVERSARY STORY OPPORTUNITIES -- JULY 1994

Twenty-five years ago, Neil A. Armstrong made a "giant leap for mankind, when he became the first person to set foot on the moon on July 20, 1969. NASA Langley helped make those first steps possible. Langley researchers and engineers conducted fundamental research and helped establish mission concepts central to the success of the Apollo program. On the 25th anniversary of the first manned lunar landing, there are many opportunities to tell the story of Langley's contributions to the Apollo mission.

NASA OPEN HOUSE. In celebration of the Apollo 11 mission, NASA Langley will host an open house July 16 featuring a cross section of Langley's current research and technology. The open house will include several operational Center facilities as well as historic facilities essential to the Apollo mission. Visitors can see the former Lunar Landing Research Facility and the Rendezvous and Docking Simulator, both used to train the Apollo astronauts and designated National Historic Landmarks. Hours: 9 a.m. to 4 p.m.
CONTACT: Bert Rockey (804) 864-6850

MODEL ROCKET LAUNCH. The NASA Langley chapter of the National Space Society will host its annual model rocket launch beginning at 10 a.m. on July 16. Throughout the day, adults and children will be able to purchase Estes model rocket kits at the site, then build and launch them. Russian space historian Peter Gorin and other speakers will attend the event, which will occur in the picnic area behind the H.J.E. Reid Conference Center, 14 Langley Blvd. Presentations start at 2 p.m.
CONTACT: Doug Stanley, Langley N.S.S. chapter, (804) 864-4518

JULY COLLOQUIUM. On July 20, John Houbolt, a vital contributor to the drive to put a man on the moon, will highlight the struggle to have the "unpopular" Lunar Orbit Rendezvous concept adopted. Historians consider the concept a crucial element in the success of the Apollo Program. Without it, President Kennedy's vision for a manned lunar landing before the end of the 1960s would have been impossible. The colloquium will begin at 2 p.m. in the H.J.E. Reid Conference Center, 14 Langley Blvd. A similar presentation will be held at 7:30 p.m. that evening at the Virginia Air and Space Center.
CONTACT: Kirsten Williams (804) 864-6527

COMMEMORATIVE STAMP CEREMONY. The U.S. Postal Service will commemorate the Apollo 11 mission with two specially designed postage stamps. NASA Langley and the Hampton Postmaster will participate in the unveiling ceremonies and provide the stamps for first-day-of-issue pictorial cancellation. The ceremony will be held July 20 at 10 a.m. in the H.J.E. Reid Conference Center, 14 Langley Blvd., and stamps will go on sale immediately following the ceremony.
CONTACT: Kirsten Williams (804) 864-6527

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VASC PRESENTS "OUR PLACE IN SPACE." In honor of the Apollo 11 silver anniversary, the Virginia Air and Space Center will kick off the three-part "Our Place in Space" program in July to educate the community about the past, present and future of space exploration. The campaign will feature a new exhibit about early space flight speculation called "Blueprint for Space" opening July 20. Other events include a five-day astronaut adventure day-camp beginning July 18 and an open house scheduled for July 23.
VASC CONTACT: Kim Hinson (804) 727-0900

OTHER:

NEW BOOKS HONOR PROJECT APOLLO. The NASA History office is publishing two new volumes in its "Monographs In Aerospace History" series in commemoration of the Apollo 11 25th anniversary.
•An Annotated Bibiliography of the Apollo Program, authored by NASA historian Roger D. Launius and J.D. Hunley, is a reference work containing a selected bibiography of published works about Project Apollo with annotations.
•Apollo: A Retrospective Analysis, authored by Launius, is a short narrative history of the program, along with a synopsis of Apollo missions and reproductions of selected key documents. Books will be available in early July.
CONTACT: Roger Launius (202) 358-0383.

TBS TELEVISION DOCUMENTARY. Langley's contributions to the Apollo 11 mission have been recorded in the TBS documentary, "Moon Shot." The two-part program, which focuses on the Apollo 11 accomplishments and the 25th anniversary of the landing, contains historical footage provided by Langley. The documentary will air July 11 and 13 from 8:05 p.m. to 10:05 p.m. on TBS.

RESOURCES TO HELP TELL THE APOLLO STORY

25TH ANNIVERSARY PRESS KIT. A good "starter kit," complete with selected photographs and information items. Call for your own kit.
RESOURCES CONTACT: Kirsten Williams (804) 864-6527

FEATURE RELEASE. This eight-page feature highlights Langley's contributions to the Apollo program.

FACT SHEETS. Several comprehensive written summaries tell different facets of the Apollo 11 story. Each has illustrations and captions. They include:

"Langley Contributions to Spaceflight," 12 pp. Overview of Langley's contributions to manned and unmanned spaceflight.

"Lunar Orbit Rendezvous," 8 pp. Chronicles how the darkhorse candidate concept for getting to the moon eventually won over direct ascent. The lunar orbit concept was an important step in landing a man on the moon before the end of the 1960s and perhaps Langley's greatest contribution to the Apollo program.

"Langley National Historic Landmarks," 8 pp. Outlines Langley's five historical landmarks, including the Lunar Landing Research Facility and the Rendezvous and Docking Simulator, and the contributions of each.

APOLLO VIDEO. An excellent 26-minute overview of the Apollo 11 mission is available on Betacam SP or VHS.

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

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For Release:
June 23, 1994

RELEASE: 94-066

NASA/FAA SPONSOR GENERAL AVIATION COMPETITION

NASA and the Federal Aviation Administration (FAA) today announced their joint sponsorship of a general aviation design competition for students at U.S. aeronautical and engineering universities. The contest will challenge teams of undergraduate and graduate students -- working with faculty advisors -- to develop a multi-disciplinary design for a general aviation aircraft.

Complete competition guidelines will be available by mid-July. Designs must be submitted by May 1, 1995. Up to four cash awards totaling $11,000 will be announced at an awards ceremony in July 1995 at the annual Experimental Aircraft Association Fly-In Convention and Sport Aviation Exhibition at Oshkosh, Wisc.

"These are the types of opportunities NASA needs to develop to capture the

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bold initiative and innovative enthusiasm that exists in our nation's college ranks," said Dr. Wesley L. Harris, NASA's Associate Administrator for Aeronautics. "This partnership with academia -- and ultimately, industry -- represents the way we want to do business at NASA," he said.

Richard A. Weiss, the FAA's Director of General Aviation and Vertical Flight Research and Development notes, "It is the policy of the FAA to foster and promote general aviation. It is our hope that participation by universities will become an integral part of the revitalization effort now underway and that the competition will serve to stimulate breakthroughs in technology and its application."

Technologies to be addressed in the competitive designs will include integrated cockpit systems, propulsion, integrated design and manufacturing and aerodynamics. For purposes of the competition, general aviation aircraft are defined as fixed-wing, single-engine, single pilot, propeller-driven aircraft.

"Universities have drifted away from general aviation with the decline in the industry's condition. NASA and the FAA developed this competition to help reverse that trend and begin to involve faculty and students in general aviation," said Dr. Bruce J. Holmes, Manager of NASA's General Aviation Program Office, Langley Research Center, Hampton, Va.

All designs submitted in accordance with competition guidelines will be reviewed by a selection panel of representatives from NASA, the FAA and industry. All design projects will receive critical evaluation and feedback. Faculty and students are encouraged to plan now to incorporate this design challenge into fall design classes and projects. Involvement of industry advisors is encouraged, as is the participation of women and minorities on design teams. Teaming across departments and among institutions also is encouraged.

Interested faculty and students may request guidelines from: Virginia Space Grant Consortium, 2713-D Magruder Blvd., Hampton, Va. 23666. Requests may be faxed to 804/865-7965. The Consortium, a nonprofit aerospace educational coalition, is disseminating information on the competition on behalf of the sponsoring agencies.

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NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release:

Kirsten Williams
(804) 864-6527

June 24, 1994

RELEASE NO. 94-067

LANGLEY RESEARCHER SELECTED FOR ALUMNI HONOR ROLL

NASA Langley researcher Bruce Holmes has been named to the 1994 Aerospace Engineering Alumni Honor Roll at the University of Kansas.

Holmes, who manages the Short Haul General Aviation/Commuter Program and Advanced Subsonic Technology at Langley, was selected for his accomplishments in natural laminar flow flight research. These accomplishments have lead to applications of natural laminar flow drag reduction technologies on production aircraft.

Holmes holds several patents and has received numerous awards from NASA, the Society of Automotive Engineers and the American Institute for Aeronautics and Astronautics. He earned his bachelor of science, master of science and doctor of engineering degrees in aerospace engineering from University of Kansas.

The University of Kansas Aerospace Engineering Department established the Alumni Honor Roll in 1993 to recognize personal engineering achievement, leadership and service. The awardees serve as role models and sources of motivation for current and future engineering students.

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NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release:

Diana Pope
(804)864-8241

July 1, 1994

RELEASE: 94-068

* *

WHO:	NASA Langley Research Center
WHAT:	Open House
WHERE:	Hampton, Va., 3 miles off Interstate 64
WHEN:	Saturday, July 16, 9 a.m. to 4 p.m.
WHY:	In commemoration of the 25th anniversary of the Apollo 11 moon landing

* *

NASA LANGLEY'S OPEN HOUSE CELEBRATES PAST, FUTURE

In recognition of the 25th anniversary of the Apollo 11 moon landing, NASA's Langley Research Center will hold an Open House. On Saturday, July 16, from 9 a.m. to 4 p.m., visitors will see a cross-section of Langley work, cutting-edge research and technology proudly rooted in the past, yet clearly focussed on the future.

The Open House will be a free, self-directed, walking tour of selected Langley facilities. A sign-language interpreter will be available to intrepret selected sites at special tours at 11 a.m. and 2 p.m. leaving from the information desk at the Reid Conference Center.

The Reid Conference Center will feature "Apollo 11 Highlights," a 30-minute film shown on the hour throughout the day. The film is closed-captioned for the hearing-impaired. Refreshments will be available on the Conference Center grounds.

Open House visitors will see two National Historic Landmarks, both crucial elements of the Apollo success story:

Today's Impact Dynamics Research Facility was originally called the Lunar Landing Research Facility and was used to simulate lunar landings during the Apollo program. A lunar module, suspended from the gantry, enabled astronauts to practice landing on the moon's surface. Refurbished by students at New Horizons Technical Center, the lunar module is now on display at the Virginia Air and Space Center. Presently, the facility is used to crash test full-scale aircraft. Test articles from crashworthiness tests will be displayed during Langley's Open House.

The Rendezvous Docking Simulator hangs from the ceiling of Langley's aircraft hangar. It allowed Apollo researchers and astronauts to practice mating vehicles in space.

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RELEASE NO. 94-068 July 1, 1994

Flight simulation training was key to the Apollo 11 mission; most of the training the astronauts had for the mission was on simulators. Visitors to the Flight Simulation facility can see two types of simulators used today, and "junior pilots" can manipulate target models. Visitors will also see the electronic moving map developed to aid pilots in taxiing.

Visitors will hear (and feel!) a sonic boom demonstration, learn about noise reduction research and witness a demonstration of active noise control. Children can explore characteristics of sound at an interactive display.

At the Guidance & Control exhibit, children can earn certificates for operating a flight simulator and participating in interactive demonstrations.

Visitors will also have opportunities to walk through wind tunnel facilities and examine the specially-adapted interior of a Boeing 737 aircraft.

The Office of Education will feature examples of Distant Learning, which includes music provided by the Hampton City School System. The principal actors from "Mission Earthbound," an interactive television program designed to teach children about atmospheric sciences, will be signing autographs, and children will receive a model airplane kit.

Visitors will see how researchers use X-ray, ultrasonic and thermal equipment to view internal structures of materials used in constructing aircraft. Displays will elaborate on the processes and significance of examining materials for flaws and irregularities that might make an aircraft unsafe.

The Low-Frequency Antenna Test Facility simulates a space environment. Visitors will see the large, echoeless chamber in which antennae are measured.

At the Space Robotics exhibit, visitors will learn about an on-orbit, space manipulator (robot arm) that services and repairs spacecraft. They will also see a "virtual camera" which provides multiple, simultaneous, undistorted images of selected portions of the hemisphere directly in front of a television camera. Such remote viewing could be useful for security systems, medical endoscopy, deep sea exploration, etc.

Also on July 16, the National Space Society will sponsor a model rocket launch on Reid Conference Center grounds. For the price of the kit, approximately $5 per person, visitors can assemble and launch their own small rockets.

NASA Langley Research Center is located in Hampton, 3 miles off Interstate 64. Both the Main Gate, off Commander Shepard Blvd., and the Wythe Creek Gate will be open on July 16.

For more information about the Open House, call Bert Rockey at (804) 864-6850.

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NOTE TO EDITORS: Escorts will be available at Open House to assist media who wish to cover the event. Report to the media center at the Reid Conference Center.

We would be happy to accommodate those who would like to do a story in advance of the Open House. Historic photos, background materials and interview opportunities are available by calling Kirsten Williams at 864-6527.

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

RELEASE NO. 94-069

For Release:

LANGLEY STORY OPPORTUNITIES -- JULY 1994

NASA OPEN HOUSE. NASA Langley will host an open house on July 16 featuring a cross section of Langley's research and technology. The open house will include several operational center facilities as well as historic facilities esssential to the Apollo mission. Visitors can see the former Lunar Landing Research Facility and the Rendezvous and Docking Simulator, both used to train the Apollo astronauts and designated National Historic Landmarks. Hours: 9 a.m. to 4 p.m. For more information, see press releases 94-065 or 94-068.
CONTACT: Bert Rockey (804) 864-6850

JULY COLLOQUIUM: FROM SPUTNIK TO THE "GIANT LEAP." On July 20, John Houbolt, a vital contributor in the drive to put a man on the moon, will trace spaceflight history from Sputnik to the first Apollo manned lunar landing. The presentation will begin at 2 p.m. in NASA Langley's H.J.E. Reid Conference Center, 14 Langley Blvd. A similar presentation will be held at the Virginia Air and Space Center at 7:30 p.m. that evening. For more information, see press release 94-065.
CONTACT: Kirsten Williams (804) 864-6527

LET'S CELEBRATE SPACE WEEK. Plans to celebrate Space Week 1994, a national event planned by Space Week International on July 16-24, are already under way for the Virginia Air and Space Center and the Langley chapter of the National Space Society. The VASC will offer free admission to all exhibits on July 23 and a musical called "Footprints on the Moon" throughout the week. The NSS will sponsor a model rocket launch behind the Reid Conference Center, 14 Langley Blvd., July 16 at 10 a.m.
VASC CONTACT: Kim Hinson (804) 727-0900
LANGLEY NSS CONTACT: Doug Stanley (804) 864-4518

TEACHERS TO TRAVEL INFORMATION SUPERHIGHWAY. Eight local teachers will spend their summer learning how to reach out and touch someone via computer. These teachers are participants in the annual High Performance Computing and Communications (HPCC) K-12 Summer Training Institute which begins July 5. The Institute is part of a Langley pilot program that focuses on enriching the science and mathematics curriculum in grades K-12 by transferring NASA's computer technology to the classroom. It has brought inexpensive direct Internet access to public schools.
CONTACT: Kirsten Williams (804) 864-6527

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FIGHTING FIRES WITH COMPUTERS. NASA Langley is developing a database that would allow firefighters to obtain all available information about a fire scene *before* they arrive. Using Geographic Information System (GIS) technology, firefighters could install in the fire house a computer that would display the best route to travel, building floor plans and locations of personnel, equipment, hazardous materials and utility shut-off valves. GIS could help the decision-making process in areas like planning, design and maintenance by combining computer graphics, facilities and utilities.
CONTACT: Brian Fowler (804) 864-9396

CLUES TO THE OZONE MYSTERY. In late July, researchers from NASA Langley will fly to Christchurch, New Zealand to continue an experiment examining the causes of ozone loss in the stratosphere of the Southern Hemisphere. These researchers are participating in the Airborne Southern Hemisphere Ozone Experiment and Measurements for Assessing the Effects of Stratospheric Aircraft Experiment, a four-part, international campaign. The combined study will provide information about the seasonal evolution of Antarctic ozone loss and the potential environmental effects of high-speed stratospheric aircraft.
CONTACT: Kirsten Williams (804) 864-6527

OSHKOSH '94. NASA Langley will support the world's largest fly-in with speakers on diverse aeronautics topics and with displays of NASA-developed technology. NASA transfers technology to the general aviation (lightplane) industry and to thousands of hands-on aviation enthusiasts in Oshkosh, Wisc. Experimental Aircraft Association/ Oshkosh Convention & Air Show is set for July 28-Aug. 3 at Wittman Field.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124
EAA CONTACT: John Burton (414) 426-4829

STORY OPPORTUNITIES IN AUGUST AND SEPTEMBER:

LASE FLIGHT TESTING. In late August, the Lidar Atmospheric Sensing Experiment (LASE) instrument will be flight tested at NASA's Wallops facility. Langley engineers are developing the experiment for flight aboard the NASA ER-2 airplane and eventual flight aboard the shuttle.

A VETERAN AIR POLLUTION MAP. NASA Langley's Measurement of Air Pollution from Satellites (MAPS) instrument is scheduled to fly its second shuttle mission this year and fourth overall, aboard the Space Shuttle Endeavor. The 10-day mission, targeted for an August 18 launch, is designed to study Earth's changing environment from space, using the instrument to measure carbon monoxide concentrations.

'LITE' TO FLY IN SEPTEMBER. What do thin clouds, atmospheric dust particles and the Earth's surface all have in common? The ability to make a Langley-built lidar bounce off of them. This Langley-lead, international experiment, called LITE, will travel aboard the space shuttle Discovery in early September. It will demonstrate how lasers can be used as research tools in space and how they can help scientists understand the complex factors which control the Earth's weather and climate. "LITE" will be the first civilian lidar, the laser equivalent to radar, in space.
CONTACT: Keith Henry (804) 864-6124

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NASA News

National Aeronautics and
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Langley Research Center
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Kirsten Williams
(804) 864-6527

For Release:
July 5, 1994

RELEASE NO. 94-072

SAWYER LEADS LANGLEY'S HIGH-SPEED RESEARCH PROJECT OFFICE

Wallace C. Sawyer has been named director of the High-Speed Research Project Office at NASA's Langley Research Center, Hampton, Va.

As director, Sawyer will oversee Langley's efforts as lead center of NASA's High-Speed Research Program. He will provide project leadership for activities conducted at NASA Lewis and Ames Research Centers. Sawyer also will be responsible for leading the development of critical technologies in the areas of aerodynamic performance, airframe materials and structures, flight deck technology, propulsion technology and system integration to support the development of a potential high-speed civil transport.

Sawyer served as deputy director of the Aeronautics Program Group at Langley from February to June 1994. As deputy director, he was responsible for strategic planning, advocating for resources, maintaining external and internal customer interfaces, and coordinating aeronautical systems analyses studies.

Sawyer began his Langley career in 1965 as an aerospace engineer. He has served as head or assistant head of several branches; asssistant chief of the Advanced Vehicles Division; acting deputy director of Aeronautics for High-Performance Aircraft at NASA Headquarters; chief, Advanced Vehicles Division; and acting deputy director for Aeronautics.

Sawyer received a bachelor of arts degree in physics and mathematics from Elon College in North Carolina and has done graduate work in physics at the College of William and Mary and in engineering management at George Washington University.

The author or co-author of 45 technical publications and a chapter in a technical textbook, Sawyer is an associate fellow of the American Institute of Aeronautics and Astronautics.

-end-

NASA News

National Aeronautics and
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Drucella Andersen
Headquarters, Washington, D.C.
(Phone: 202/358-4733)

H. Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6124)

For Release:
July 15, 1994

RELEASE: 94-074

BOEING AND DOUGLAS TEAM UP IN HIGH-SPEED AERO CONTRACT

NASA today announced the award of a $440 million contract that marks the first time America's two leading airplane manufacturers have teamed up to develop technologies for a potential future U.S. High-Speed Civil Transport (HSCT).

This precedent-setting action joins Boeing Commercial Airplane Group, Seattle, Wash., with McDonnell Douglas Aerospace, Long Beach, Calif., and other companies to develop airframe technologies for aerodynamics, flight systems, and materials and structures.

"Developing the technologies for a future supersonic airliner that will be environmentally friendly and economically successful presents a major challenge and opportunity," said Louis J. Williams, Director of NASA's High-Speed Research (HSR) program. "This contract effectively combines the expertise and capabilities of U.S. industry to accomplish this goal," Williams said.

Boeing has proposed that McDonnell Douglas serve as the company's principle subcontractor. By working together under a single contract, the two companies will be able to reduce redundancies, lower costs and accelerate research, ensuring that the United States remains at the forefront in commercial aerospace competition.

Boeing and McDonnell Douglas, along with General Electric Corp. and Pratt & Whitney, previously had competed via separate NASA contracts in the first phase of the NASA HSR program. Phase I was aimed at developing technologies to address important environmental issues such as the reduction of noise and engine emissions.

Progress made in Phase I has led to Phase II of the program, which focuses on moving technology concepts out of the laboratory and into practical applications. Phase II will focus on developing and providing the technology necessary to make a future supersonic airliner economically practical as well as environmentally compatible.

In June, NASA awarded Honeywell Inc. $75 million to conduct flight deck systems research and technology development for the potential HSCT, and last year the agency selected GE and

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Pratt & Whitney to negotiate a contract for propulsion technologies.

The HSCT, a commercial supersonic aircraft, could fly 300 passengers across the Pacific or Atlantic Oceans at 2.4 times the speed of sound -- cutting travel time by more than half. The new aircraft will fly faster than the Concorde, go nearly twice as far and be able to carry three times as many passengers.

The second phase also will include performance evaluations of representative engine components, structural verification tests of new engine and airframe materials and flight tests of better wing designs and new cockpit technology.

The flight deck systems effort will develop controls, guidance and synthetic vision technology, such as might be used to allow the pilot to fly the aircraft in all weather conditions with a "no-nose-droop" design, a significant improvement over the first generation Concorde.

The main objective of the aerodynamics effort is to develop technology to increase the supersonic and subsonic cruise performance of the potential transport. Researchers will use wind tunnels and computational techniques to look at several different designs for the transport's components, primarily the wing and the horizontal tail.

Researchers in materials and structures will develop new metallic alloys and composite materials for the airframe that can withstand temperatures of up to 350 degrees Fahrenheit at cruise speeds. Also, researchers will develop technology to produce wing and fuselage structures that are 33 percent lighter in weight than comparable Concorde structures, while also economical to manufacture and highly durable.

NASA's HSR program, begun in 1990, is the cornerstone of NASA aeronautics research for the 1990s. Funding for the agency's program, which addresses only high-risk, high-priority technology, totalled $197 million this fiscal year, with comparable investments planned through the end of the century. American industry is making parallel investments to complete the high-risk technology, and they will decide whether building a next-generation supersonic transport makes good business sense.

NASA's Office of Aeronautics, Washington, D.C., directs the High-Speed Research program. NASA's Langley Research Center, Hampton, Va., is the agency's lead center for overall technical project implementation, with the Lewis Research Center, Cleveland, leading the propulsion technology development. The Dryden Flight Research Center, Edwards, Calif., is working on laminar flow control, flight testing and sonic boom research for the HSR program, while the Ames Research Center, Mountain View, Calif., is working on flight deck technology, sonic boom and aerodynamics research.

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EDITORS NOTE: A videotape describing NASA's High-Speed Research program is available to media representatives by faxing a request to 202/358-4333. The video length is 1 minute and 11 seconds. Still photos of the Boeing and McDonnell Douglas concepts of the High-Speed Civil Transport are available by faxing a request to the same number.

	Color:	B&W:
McDonnell Douglas:	94-HC-184	94-H-198
Boeing:	94-HC-185	94-H-199

NASA News

National Aeronautics and
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(804) 864-6120 (Work)
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For Release:
May 1994

RELEASE NO. - 94-075

A PRECAUTIONARY NOTE TO AMATEUR ASTRONOMERS

SEPTEMBER SPACE SHUTTLE MISSION TO USE REMOTE SENSING LASER

For nine days in September 1994, NASA Langley Research Center will fly a new type of atmospheric remote sensing instrument aboard the Space Shuttle Discovery (STS-64). The instrument, called LITE (Lidar In-space Technology Experiment, where lidar - LIght Detection And Ranging), uses a laser to transmit a very short pulse of coherent, high intensity light downward into the atmosphere. These pulses will occur ten times per second and each pulse will last only 30 billionths of a second. As the laser pulse travels down into the atmosphere it interacts with clouds and atmospheric aerosols. This interaction with particles in the atmosphere causes some of the light energy to be reflected back towards the LITE instrument. The reflected energy is collected by a large telescope mounted in the Shuttle payload bay where it is subsequently converted into an electrical signal by a photosensitive detector.

The LITE experiment is the first use of a space-born laser for atmospheric remote sensing and the most powerful civilian laser ever flown in space. The LITE laser will transmit three harmonically related wavelengths simultaneously at the energy levels shown in the table below. The three wavelengths correspond to near infrared light (1064 nm), green visible light (532 nm), and ultraviolet light (355 nm).

Wavelength (nanometers)	Output Energy (millijoules)
1064 nm	450 mJ
532 nm	600 mJ
355 nm	170 mJ

Observers on the ground attempting to view the Shuttle with the naked eye are not at risk of injury, nor are observers using ordinary binoculars or small telescopes (up to approximately six inches in diameter). Telescopes larger than six inches in diameter, however, are capable of collecting sufficient energy to bring the total Radiant Exposure (RE) to a level which exceeds the ANSI Maximum Permissible Exposure (MPE) for the 532 nm wavelength. Therefore, direct viewing of the Shuttle through telescopes larger than six inches in diameter is not advisable and should not be attempted. Capturing images photographically or electronically should not present a hazard to the observer, however, highly sensitive photo-electronic detectors could possibly be damaged.

For more information on the LITE experiment please contact Keith Henry at the Langley Research Center Public Affairs Office.

NASA News

National Aeronautics and
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For Release:

Olin Jarrett Jr.
(804)864-6320

July 15, 1994

RELEASE NO. 94-076

EARTH OBSERVING SYSTEM INFORMATION FACILITY TO BE DEDICATED

NASA Langley officials will dedicate the new Earth Observing System archive building at the corner of Langley Blvd. and South Wright St. on Wednesday, July 20 at 9 a.m.

The Honorable Ralph M. Hall (D-Texas), chairman of the House Subcommittee on Space, Committee on Science, Space and Technology, and the Honorable Herbert H. Bateman (R-Va.) will be the keynote speakers for the event. Center Director Paul F. Holloway will be master of ceremonies.

The building, 1268C, will house the Distributed Active Archive Center, part of the Earth Observing System Data and Information System. The information system supports the Earth Observing System, an essential part of the agency's Mission to Planet Earth program.

The Earth Observing System, a long-term "global change" research program, will improve our understanding of the Earth as a system of natural processes involving the atmosphere, oceans and land. The program focuses on understanding the causes and processes of global climate change. Through this study, scientists will be able to predict climate changes and see how human activities affect these changes and vice versa. The program involves several satellite flight projects, research and information systems.

Langley will play an important role in storing information about clouds, aerosols, tropospheric chemistry and earth's radiation budget and helping customers access that information in the new archive center. The eight other archive centers, located across the country, will store information on different global change topics, although a customer can receive information from all nine archive centers by accessing just one.

Through the Earth Observing System and Mission to Planet Earth programs, scientists will develop the knowledge necessary to support the complex environmental policy decisions looming ahead.

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NASA News

National Aeronautics and
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Hampton, Virginia 23681-0001

RELEASE NO. 94-079

For Release:

LANGLEY STORY OPPORTUNITIES -- AUGUST 1994

BUILDING THE INFORMATION SUPERHIGHWAY - FROM DREAM TO REALITY. On August 8, Dr. Jose'-Marie Griffiths, vice chancellor for computing and telecommunications at the University of Tennessee-Knoxville, will talk about the National Information Infrastructure, more commonly known as the information superhighway, and its impact on the individual. Her presentation will begin at 2 p.m. in NASA Langley's H.J.E. Reid Conference Center, 14 Langley Blvd.
CONTACT: Kirsten Williams (804) 864-6527

AVIATION RESEARCH SOARS AT OSHKOSH. NASA Langley will participate at the annual Experimental Aircraft Association Fly-In Convention and Sport Aviation Exhibition at Oshkosh, Wisconsin, July 28-Aug. 3. This year, NASA exhibits will feature general aviation research. Displays will highlight the agency's joint effort with industry and academia to pioneer high-payoff aeronautics technologies that make American aircraft more competitive, friendlier to the environment and safer to fly. Displays on the agency's space programs, like the Hubble Space Telescope, Space Shuttle and the Space Station, will also be included.
CONTACT: Keith Henry (804) 864-6124

AERO CONTRACT TO FURTHER HIGH-SPEED PROJECT. NASA is moving closer to the development of technologies for a potential high speed civil transport (HSCT) with the recent award of a $440 million contract to Boeing Commercial Airplane Group, Seattle, Wash. The company has proposed that McDonnell Douglas Aerospace, Long Beach, Calif., serve as the principle contractor, making this the first time America's two leading airplane manufacturers have teamed up to develop such technologies. NASA Langley is the agency's lead center for overall technical project implementation. The HSCT could fly 300 passengers across the Pacific or Atlantic Oceans at 2.4 times the speed of sound -- cutting travel time by more than half.
CONTACT: Keith Henry (804) 864-6124

FLIGHTS ADVANCE WEATHER RESEARCH. Beginning August 26, NASA Langley will flight test a weather instrument at NASA's Wallops facility. The instrument will help scientists track weather fronts and obtain information about the Earth's hydrological cycle. Langley engineers are developing the experiment, called the Lidar Atmosphereic Sensing Experiment (LASE), for flight aboard the NASA ER-2 high-altitude observation airplane, where it will measure water vapor concentrations and aerosols (suspended particles) in the troposphere. LASE is scheduled to make its first scientific flight above Oklahoma in April 1995 as part of the GEWEX Water Vapor Project, a project including NASA, NOAA and the National Weather Service.
CONTACT: Cathy Watson (804) 864-6128

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LANGLEY FLIES HIGH ON STS-68:

"MAPPING" AIR POLLUTION. On August 18, Space Shuttle Endeavor will blast off carrying a NASA Langley instrument that will "map" carbon monoxide concentrations in the lower atmosphere. The Measurement of Air Pollution from Satellites (MAPS) instrument will concentrate on measuring the effects of biomass burning on the levels of carbon monoxide in the tropics and Southern Hemisphere. Because MAPS also was flown in April on the shuttle, this will be the first opportunity to study seasonal differences in the carbon monoxide levels around the globe.
CONTACT: Cathy Watson (804) 864-6128

STUDENTS EXPERIMENT WITH NORSTAR. A group of Norfolk public school students are anxiously awaiting the launch of space shuttle Endeavor on August 18. These students are participating in the Norfolk Public Schools Science and Technology Advanced Research (NORSTAR) program which has prepared an experiment to be flown on the shuttle. The NORSTAR program began several years ago with a $10,000 gift from NASA Langley. The experiment will visually record how sound affects dust particles in near-zero gravity, contributing to a better understanding of acoustics.
PUBLIC AFFAIRS CONTACT: Cathy Watson (804) 864-6128
NORFOLK PUBLIC SCHOOLS CONTACT: Joy Young (804) 441-5633

NEW RESOURCES AVAILABLE:

U.S. GENERAL AVIATION: INGREDIENTS FOR A RENAISSANCE. NASA's effort to support revitalization of the ailing general aviation industry is highlighted in this new fact sheet available from NASA Langley. NASA Facts #228 outlines the decline of general aviation in the United States and the innovations intended to reverse the trend. Included in the factsheet are NASA's innovations in cockpit automation, increasing all weather safety and utility, engine performance and creating lighter, stronger composite materials for aircraft construction.
CONTACT: Brian Fowler (804)864-9396

ON THE HORIZON:

LANGLEY EXPERIMENT TO SHED SOME 'LITE' ON THE ATMOSPHERE. In early September, space shuttle Discovery will demonstrate the first civilian lidar in space, beaming bursts of laser light down through the atmosphere, into clouds and onto the Earth's surface. Lidar is similar to radar, but sends pulses of light rather than microwaves. This experiment is supported by an international team of scientists who will be taking corresponding measurements of the atmosphere while 'LITE' orbits the Earth. LITE stands for Lidar In-space Technology Experiment. Interview, photos available.
CONTACT: Allison Ballew (804) 864-8150

-end-

NASA News

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804/864-6124

Marcia Westmorlan
804/864-6122

For Release:

Aug.8, 1994

RELEASE NO. 94-082

NOTE TO EDITORS: MEDIA INVITED TO PARTICIPATE IN NATIONAL BRIEFING ON NASA LANGLEY SHUTTLE PAYLOAD

News media are invited to participate in a national media briefing on a NASA Langley Space Shuttle experiment scheduled to launch in September.

The Aug. 16 briefing will feature a NASA Langley experiment that will put the first laser in space for measurement of the earth's atmosphere.

"LITE" is a Langley-conceived experiment to demonstrate the utility of a space-based "optical radar." These studies are expected to fill gaps in current computer climate models.

The 10 a.m. media briefing will originate from Johnson Space Center in Houston. Hampton Roads media can participate by watching the briefing via satellite in the NASA Langley newsroom and by asking questions via telephone.

Langley briefers will be LITE Project Manager John Rogers and Project Scientist Pat McCormick.

The Langley newsroom is located in Building 1202 on 5 N. Dryden Street. Enter through the satellite cafeteria doors and follow signs to the newsroom (this is not the main cafeteria).

LITE is short for Lidar In-space Technology Experiment. A lidar is a remote sensor that works like radar, but uses short pulses of light for measurements of clouds, suspended particles and other atmospheric phenomena of interest to scientists.

It is hoped that space-based lidars will offer unprecedented accuracy in measuring clouds on a global scale. Information on clouds is critical to improving computer climate models. Only by gathering more accurate information can scientists improve their models to the point where they can confidently predict the behavior of the atmosphere and determine how the environment is being affected by human activity.

- end -

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

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For Release:
August 29, 1994

RELEASE NO. 94-083

SEPTEMBER TALK: STS-60 -- U.S./RUSSIAN SPACE COOPERATION

The launch of STS-60, the first joint U.S./Russian space shuttle mission, on Feb. 3, 1994 opened a new and important era in international space cooperation. This historic mission is the subject of NASA Langley's September colloquium on Sept. 7, 1994. Mission pilot Kenneth S. Reightler Jr. is the speaker.

The crew of STS-60 featured Russian cosmonaut Sergei Krikalev, a veteran of long-duration space flights aboard the Russian MIR Space Station. The mission included the first flight of the deployable/retrievable Wake Shield Facility and the second flight of the SPACEHAB Module which housed materials processing, biotechnology and hardware and technology development experiments.

Reightler will discuss the international implications of the joint mission as well as the mission itself.

Reightler, a Virginia Beach native, has earned numerous awards and honors, including two NASA Space Flight Medals, the NASA Exceptional Service Medal, and the Defense Superior Service and Meritorious Service Medals.

He became an astronaut in August 1988 and has served as mission pilot for STS-48 and STS-60. With the completion of his second mission, he has logged more than 327 hours in space. Reightler currently serves as chief of the Astronaut Office, Space Station Branch.

The colloquium begins at 2 p.m. A press briefing is scheduled at 1:15 p.m. Both events will be at the H.J.E. Reid Conference Center, 14 Langley Blvd., Hampton, Va. Media who wish to attend the briefing should call (804) 864-6122/4 by 12:30 p.m. on Sept. 6. A similar presentation will be held at 7:30 p.m. that evening at the Virginia Air and Space Center in Downtown Hampton, Va.

-end-

NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release:

Brian D. Fowler
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August 12, 1994

Release No. 94-084

MORE EFFICIENT ACTUATOR RECEIVES R&D 100 AWARD

A NASA Langley researcher has received an R&D 100 award for one of the 100 most significant new technical products of 1994, a material that could make speakers and pumps smaller and more efficient.

This award, for the Reduced and Internally Biased Oxide Wafer (RAINBOW) High Displacement Actuator, was presented to Dr. Stephanie A. Wise, a research engineer at NASA's Langley Research Center, Dr. Gene H. Haertling of Clemson University, Research Corporation Technologies and Aura Ceramics, Inc.

The R&D 100 award (formerly IR-100) is presented annually by *Research and Development* magazine to 100 scientists or engineers who have contributed the most significant products for advancing science and technology throughout the year. Selections are made by a panel of scientists and engineers after studying new technology around the world.

RAINBOWs are a type of ceramic that act as actuators by creating mechanical movement when an electric field is applied. When mechanically strained, they generate an electric charge, making them useful as sensors. Prior to RAINBOWs, stacks of these ceramics, called piezoelectrics, were needed to obtain

-more-

the movement caused by one RAINBOW. One RAINBOW can create a displacement 100 times greater than any previously available actuator materials.

This increased efficiency in creating mechanical movement will allow audio speakers and pumps to be made smaller without sacrifice of important characteristics. In addition, RAINBOWs make several devices possible that used to be impractical.

Other applications for RAINBOWS include use in microphones and in noise and vibration suppression systems for aircraft and automobiles. RAINBOWS can be used in devices currently employing piezoelectric actuators.

In the 25 years of NASA's participation in the R&D 100 competition, 99 NASA developments have been selected, contributing significantly to the recognition of NASA as a source of technical excellence. Langley has earned 28 of NASA's 99 awards. Wise's award is one of three R&D 100 awards given to Langley scientists and engineers in 1994.

The R&D winners will be honored at an awards banquet at the Museum of Science and Industry in Chicago on September 22. An exhibit of the award-winning products will be on display at the museum from September 17 through October 16.

-End-

NOTE: A photograph is available to illustrate this release.

NASA News

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For Release:

Brian D. Fowler
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August 12, 1994

Release No. 94-085

STRESS IMAGING INSTRUMENT RECEIVES R&D 100 AWARD

A NASA Langley researcher's instrument for studying mechanical stress has received an R&D 100 award for one of the 100 most significant new technical products of 1994.

The instrument, the DeltaTherm 1000, was developed by Brad Boyce of Stress Photonics, Inc., with technical oversight by K. Elliot Cramer, an aerospace technologist at NASA's Langley Research Center.

The R&D 100 award (formerly IR-100) is presented annually by *Research and Development* magazine to 100 scientists or engineers who have contributed the most significant products for advancing science and technology throughout the year. Selections are made by a panel of scientists and engineers after studying new technology around the world.

Using differential thermography, DeltaTherm can detect temperature changes in a solid caused by stress when the solid is compressed or expanded. DeltaTherm almost instaneously turns these temperature changes into images, detailing the areas of mechanical stress. This process is referred to as thermoelastic stress analysis. DeltaTherm's major advantage over its competitors is that it is 100 times faster at conducting this analysis. Previously, collecting

-more-

thermoelastic stress images took one half hour to one hour per image. This drastic improvement in speed means that the collection of thermoelastic stress analysis images is dramatically more efficient.

The principle application of DeltaTherm is stress analysis in the development of vehicles. It can also be used for assessing the strength of steel bridges. In orthopedics, DeltaTherm can be used in the analysis of implants and supporting bone.

In the 25 years of NASA's participation in the R&D 100 competition, 99 NASA developments have been selected, contributing significantly to the recognition of NASA as a source of technical excellence. Langley has earned 28 of NASA's 99 awards. Cramer's award is one of three R&D 100 awards given to Langley scientists and engineers in 1994.

The R&D winners will be honored at an awards banquet at the Museum of Science and Industry in Chicago on September 22. An exhibit of the award-winning products will be on display at the museum from September 17 through October 16.

-End-

NOTE: A photograph is available to illustrate this release.

NASA News

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Hampton, Virginia 23681-0001

For Release:

Brian D. Fowler
H. Keith Henry
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August 12, 1994

Release No. 94-086

METAL FLAW DETECTOR RECEIVES R&D 100 AWARD

A NASA Langley researcher's instrument for inspecting structural fatigue and corrosion has received an R&D 100 award for one of the 100 most significant new technical products of 1994.

The instrument, the Self-Nulling Eddy Current Instrument, was developed by Min Namkung, aerospace technologist at NASA's Langley Research Center, with John W. Simpson of Lockheed Engineering and Sciences Company, and research scientists at Analytical Services and Materials, Inc.

The R&D 100 award (formerly IR-100) is presented annually by *Research and Development* magazine to 100 scientists or engineers who have contributed the most significant products for advancing science and technology throughout the year. Selections are made by a panel of scientists and engineers after studying new technology around the world.

The instrument, which uses a magnetic field to detect flaws in metallic surfaces, is designed so that when placed over unflawed material, the output signal is practically null, or none. When the instrument is placed in the presence of surface breaking fatigue cracks, there is a strong output signal.

-more-

Unlike previous devices, no user training is necessary for testing and interpretation of test results. In addition, minimal power and signal display requirements combine to make the instrument extremely durable and portable.

The principal application for the instrument is detecting cracks in metallic surfaces. In addition, the instrument can be used for thickness gauging and corrosion detection for certain metals.

In the 25 years of NASA's participation in the R&D 100 competition, 99 NASA developments have been selected, contributing significantly to the recognition of NASA as a source of technical excellence. Langley has earned 28 of NASA's 99 awards. Namkung's award is one of three R&D 100 awards given to Langley scientists and engineers in 1994.

The R&D winners will be honored at an awards banquet at the Museum of Science and Industry in Chicago on September 22. An exhibit of the award-winning products will be on display at the museum from September 17 through October 16.

-End-

NOTE: A photograph is available to illustrate this release.

NASA News

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For Release:

August 30, 1994

RELEASE NO. 94-089

FIRST TEST OF SPACE-BASED LASER EXPECTED TO HELP SCIENTISTS BETTER UNDERSTAND GLOBAL CLIMATE

Langley's long-awaited LITE experiment is expected to mark a new era in remote sensing from space and possibly answer many atmospheric questions that have puzzled climate modelers for years.

LITE, which stands for Lidar In-space Technology Experiment, will be the primary payload on the Space Shuttle Discovery when it launches Sept. 9. Designed and built at NASA Langley Research Center, LITE is the first use of a lidar (Light Detection And Ranging) system for atmospheric studies from space.

Although lidars have been used for more than 30 years, first from the ground and later from aircraft, the perspective of this first lidar in space will allow the collection of atmospheric data from the tops of clouds, and within the stratosphere that was not possible from an Earth-bound perspective.

Lidars measure such things as cloud and aerosol (suspended dust particles) height and movement. Lidars have provided a powerful means of studying various aspects of the lower and middle atmosphere, (the troposphere, stratosphere and mesosphere), and among other things have contributed to our understanding of the role of clouds and aerosols in climate and ozone depletion.

LITE's laser is an active sensor and will provide better vertical resolution than passive sensors due to the short length of the laser pulses. It carries its own source of illumination - the laser - which means that it can observe during both day and night.

Two important objectives of the LITE program are to gain experience in operating a lidar in the environment of space and to determine the feasibility of an independent lidar system on a future space platform.

The atmospheric data collected during the course of the nine-day mission will prove the utility of a space-based lidar. LITE will operate and collect data for 45 hours during ten approximate 4-1/2 hour sessions and about nine 15-minute "snapshots" over specific target sites. The measurements will include observations of clouds,

- more -

tropospheric and stratospheric aerosols, characteristics of the planetary boundary layer, (the region of atmosphere where humans live, from the Earth's surface up to a one or two mile altitude), stratospheric density and temperature from 6 to 25 miles above the surface, and a number of surface characteristics.

LITE's lidar is also expected to map the particles produced by violent volcanic eruptions, biomass burning, and desert dust storms with unprecedented accuracy. Information gained from LITE may help explain the impact of human activity on the atmosphere as well as provide a new tool for improved measurements of clouds, dust particles, and the Earth's surface.

LITE's lidar instrument works by sending out short pulses of laser light, ten times every second and detecting the portion of the light reflected back to the instrument by particles in the atmosphere. These short pulses, lasting less than 30 billionths of a second each, will be in three different wavelengths: invisible ultraviolet, invisible infrared, and visible green light.

The information LITE collects will be important in improving climate models. Computer climate models are designed by scientists using information on clouds and other atmospheric phenomena gained from satellites and ground-based instruments. Climate models help explain the long-term weather conditions of the Earth but they have a number of weaknesses that scientists are working to overcome. LITE will provide new information on clouds so that simulated clouds in climate models can be made more realistic. This is important because clouds have a strong effect on the heating and cooling of the surface of the Earth and the atmosphere.

Understanding the role of aerosols, or very small particles suspended in the atmosphere, is also essential to understanding climate and predicting climate change. Aerosols occur in the atmosphere from both human and natural activity. Millions of tons of aerosols are suspended in the atmosphere as a result of activities such as forest fires and agricultural burning, volcanic eruptions, wind erosion and the use of internal combustion engines. These aerosols are believed to have the potential to reduce the extent of greenhouse warming experienced by the Earth. LITE will help study the distribution and sources of these particles.

LITE results will be thoroughly evaluated by an international team of science investigators using instruments on the ground at nearly 100 sites in approximately 20 countries. The investigators will take similar measurements from the ground with their own lidars when Space Shuttle Discovery flies overhead. There also will be balloons and five aircraft carrying lidars and other atmospheric measuring devices to help confirm LITE measurements in designated areas. The ground-based lidars will be pointed up at very nearly the same vertical columns of air, clouds, and suspended particles that LITE will examine from space. The aircraft underflights include two instrumented aircraft from the U.S., one from Canada, and two from Europe. Validation of LITE measurements is an essential part of the experiment.

A wide variety of phenomena which occur in particular geographic areas will be studied during the nine days of the mission. Examples include the organization of clouds in the Western Pacific; marine stratus cloud decks off the coasts of California, Peru, South America and Africa; plumes from biomass fires in South America and Africa; and the transport of desert dust from the Sahara, and desert dust in Australia. Tropospheric

aerosols will be studied over the Amazon rain forest and gravity waves over the Andes Mountains in South America. Atmospheric phenomena to be studied over the United States include stratospheric aerosols over Hampton, Virginia.; density, temperature and aerosol measurements over Albuquerque, New Mexico.; radiation and climate processes over Tulsa, Oklahoma; ground reflectance data over the Southwestern United States; surface calibrations over White Sands National Monument in New Mexico; smog plumes over Los Angeles; and surface measurements across the western section of the Grand Canyon.

Two shuttle maneuvers – the Landmark Track Maneuver and the Cross-Track Maneuver – will be performed by the astronauts at selected times during the mission. These roll maneuvers will change the angle at which the lidar reflects off targets, and simulate the scanning techniques planned for the next generation of satellite-based lidar instruments.

During the Landmark Track Maneuver, the crew of Discovery will orient the shuttle to fly wing forward and roll up to 30 degrees so that LITE's laser will point ahead of the orbiter onto a particular area of the Earth's surface. The laser beam will be reflected off of a body of water—initially the Atlantic Ocean. Then, as the shuttle moves, it will rotate, so that the laser beam stays fixed on one spot on the surface. The one-minute maneuver will enable plus or minus 30 degree measurements of the reflectivity from the ocean's surface at a variety of angles, and over a number of different sea surface conditions.

The Cross-Track Maneuver will involve slowly rolling the shuttle 30 degrees to one side then the other so that LITE's laser beam will scan from side to side across the shuttle's ground track.

Dozens of national and international organizations make up the LITE science and correlative measurements teams, including NASA Headquarters, Washington, D.C.; NASA Goddard Space Flight Center, Greenbelt, Maryland; NASA Marshall Space Fight Center, Huntsville, Alabama; the Jet Propulsion Laboratory, Pasadena, California; the European Space Agency, Noordwijk, The Netherlands; the Institute of Atmospheric Optics, Tomsk, Russia; the Meteorological Research Institute, Tsukuba, Japan; the Center for Atmospheric Research Experiments, Ontario, Canada; and the Division of Atmospheric Physics, Victoria, Australia.

LITE is a Langley-conceived, fabricated and managed experiment. In addition, a Langley-led science team is responsible for collecting the data from the LITE instrument. The team will put the scientific data into usable form, show its utility and make it available to other scientists for their own studies.

The science steering team predicts that the LITE mission will usher in a new era of space-based remote sensing lidars. They believe that future lidars will make global atmospheric measurements of particles and cloud distributions from free-flying satellites. To do this, lidar systems like LITE will have to be made smaller and more energy efficient to be compatible with resources on the satellites. Early systems will most likely involve scanning capabilities that will enable measurements to be made at a variety of angles.

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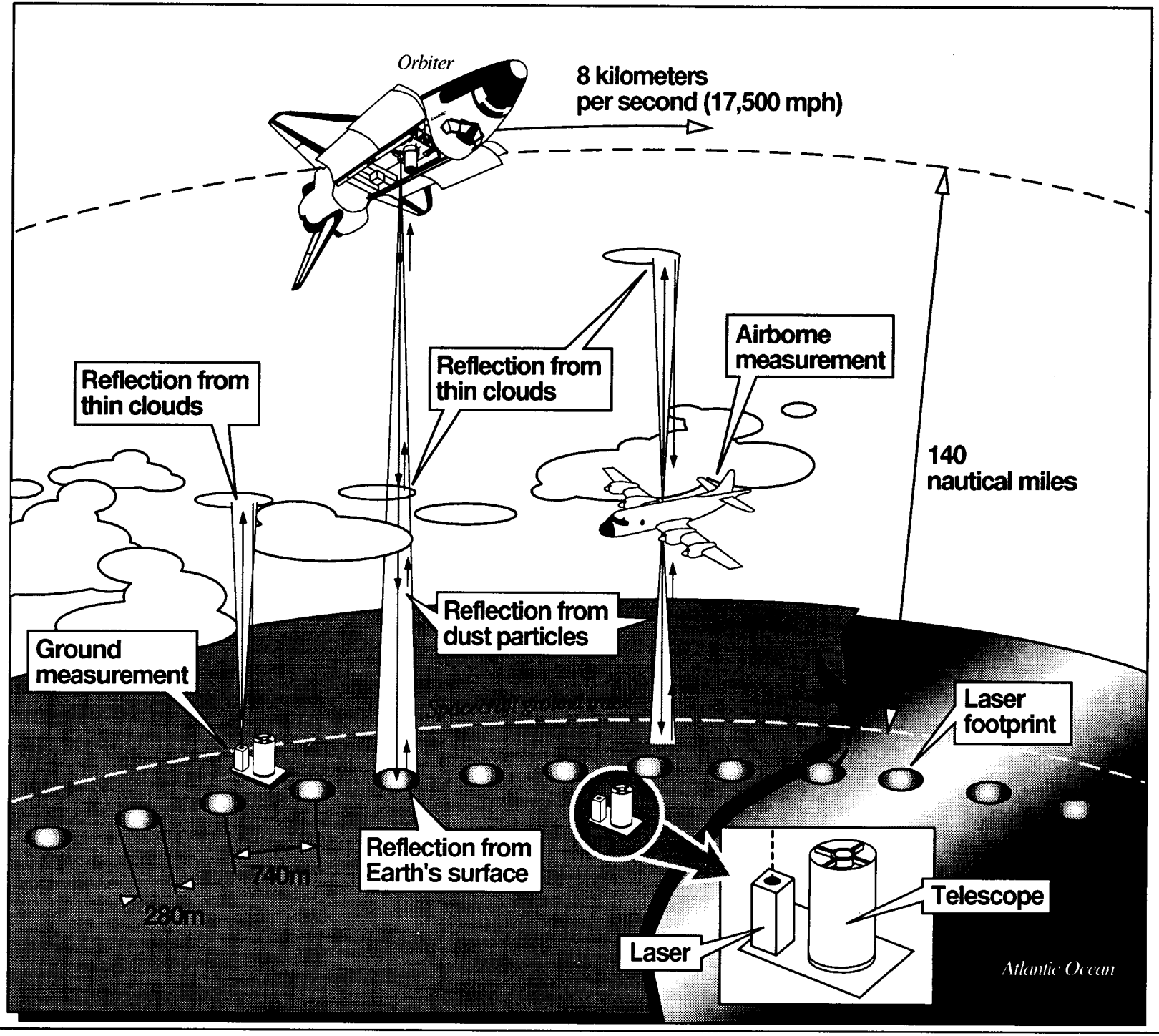
Note to Editors: Attached are three black and white graphics. Also available are the STS-64 press kit, and a LITE brochure, fact sheet, decal and simulation video.


Orbiter
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140
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measurement
Laser
footprint
Reflection from
Earth's surface
740m
280m
Telescope
Laser
Atlantic Ocean

National Aeronautics and
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Hampton, Virginia 23681-0001

For Release: August 1994
Photo Number:

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Orbiter/Ground-Based and Airborne Measurements

The Lidar In-space Technology Experiment (LITE) includes the LITE instrument aboard the Space Shuttle Discovery (STS-64), nearly 100 ground-based instruments in 20 countries, and laser systems aboard five international aircraft which will underfly the Space Shuttle. The LITE instrument in the payload bay of the Space Shuttle, 140 nautical miles above the surface and traveling at 17,500 mph, will direct pulses of laser light down towards the Earth's surface. The laser light will be approximately 280 meters in diameter (called the laser footprint) when it reaches the surface and each burst of laser light will strike the surface approximately 740 meters downtrack from the last burst. A telescope attached to the LITE instrument will collect the laser light reflected upwards from clouds, dust particles, and the Earth's surface.

The ground- and aircraft-based measurements will be used to confirm the data collected by the LITE instrument aboard the Space Shuttle. The nine-day LITE mission will provide a unique global data set of cloud characteristics, the distribution of small particles in the atmosphere (called aerosols), and the reflectivity of various types of surfaces on the Earth. Information gained from LITE can help explain the impact of human activity on the atmosphere as well as provide a new tool for improved atmospheric measurements.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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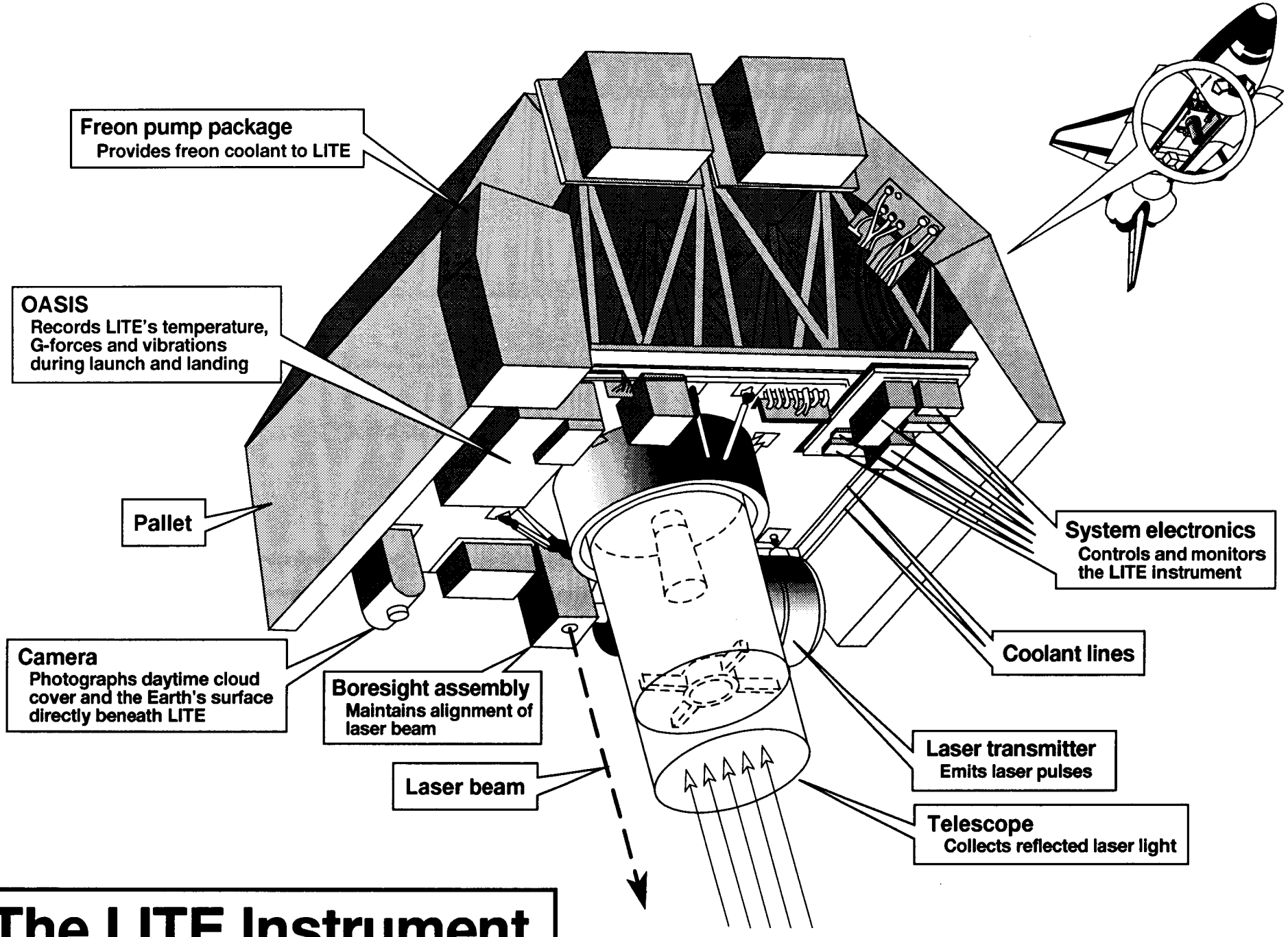
The Lidar In-space Technology Experiment (LITE) Instrument

The various components of the Lidar In-space Technology Experiment (LITE) instrument are shown as they appear on a pallet in the payload bay of the Space Shuttle Discovery (STS-64).

The LITE instrument transmits a beam of laser light downward towards the Earth where it reflects off clouds, small particles in the atmosphere (called aerosols), and the surface of the Earth. This reflected light is collected by the LITE telescope, and the intensity of the reflected light is measured and recorded by the system electronics. The boresight assembly assures that the laser beam and the telescope remain aligned so the telescope can collect the reflected laser light.

The camera aboard the LITE instrument will photograph cloud cover and the Earth's surface during daylight every 20 seconds. The pictures will be used by the LITE science team to help interpret some of the LITE measurements. The freon package and coolant lines help keep the temperature of the laser constant. The OASIS (Orbiter Experiments Autonomous Support Instrumentation System) package will measure and record LITE's temperature and the stresses and vibrations LITE experiences while on-orbit, and during launch and landing.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration



The LITE Instrument

Lidar In-space Technology Experiment

National Aeronautics and
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Hampton, Virginia 23681-0001

For Release: August 1994

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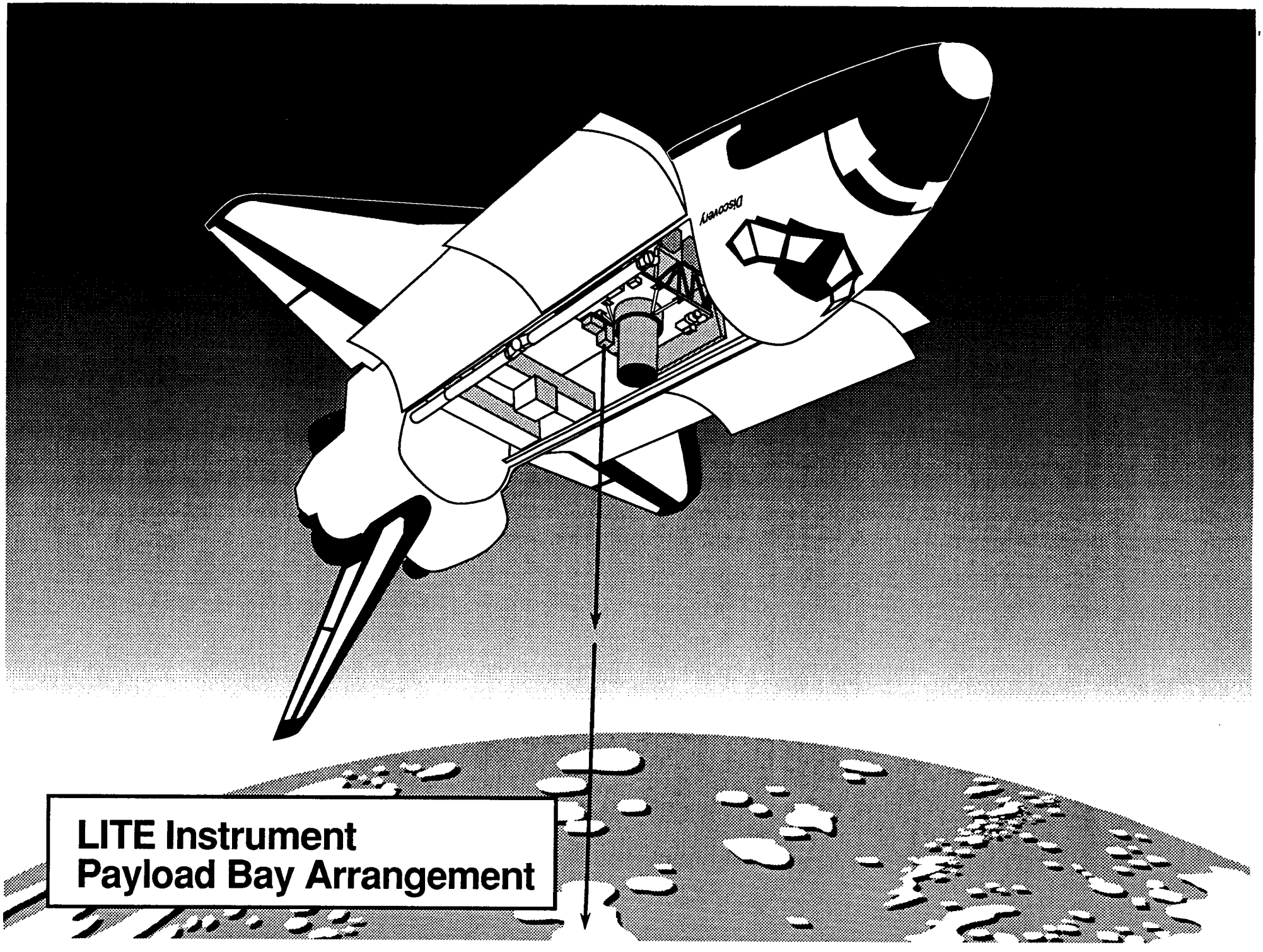
LITE Instrument--Payload Bay Arrangement

The Lidar In-space Technology Experiment (LITE) instrument is shown nestled in the payload bay of the Space Shuttle Discovery (STS-64) in orbit above the Earth. The LITE instrument will direct a beam of laser light down towards the Earth's surface to obtain valuable atmospheric data. The laser light will reflect off clouds, small particles in the atmosphere (called aerosols), and the surface of the Earth. The reflected laser light will be collected by a telescope attached to the LITE instrument and its intensity measured and recorded. An international team of scientists at nearly 100 locations around the world will also collect data from ground-based instruments and aircraft-based lasers to confirm the LITE measurements from space.

LITE was designed and built at NASA Langley Research Center. This is the first time this type of laser system -- called a lidar (LIght Detection and Ranging)-- has flown in space. Information gained from LITE can help explain the impact of human activity on the atmosphere as well as provide a new tool for improved atmospheric measurements. LITE data can also help scientists better understand our global climate.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration



LITE Instrument Payload Bay Arrangement

NASA News

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For Release:

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August 30, 1994

RELEASE NO: 94-090

NASA Wallops Aircraft Supporting September Shuttle Mission

Aircraft from the NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia, will play a vital role in supporting the Lidar In-Space Technology Experiment (LITE) during the September 1994 space shuttle mission.

During the mission, the Wallops P-3B and Electra aircraft will underfly the space shuttle Discovery at approximately 20,000 feet (6,096 meters) over North and South America, the Atlantic Ocean and Africa taking measurements to validate the LITE measurements.

The mission is the first operation of a lidar (light detecting and ranging) system in Earth orbit to measure atmospheric properties. LITE was developed by the NASA Langley Research Center, Hampton, Virginia.

Lidars, which work like a radar but use short pulses of light, measure clouds, suspended particles called aerosols, and other atmospheric phenomena of interest to scientists. They have provided a powerful means of studying various aspects of the troposphere and stratosphere and have contributed to our understanding of the role of clouds and aerosols in climate and ozone depletion.

The two Wallops turbo-prop aircraft will carry instruments to conduct both tropospheric and stratospheric lidar measurements and will cover wide geographic regions.

Ground-based lidars in the United States, Europe, and Australia also will take measurements during space shuttle Discovery passes. In addition to the lidar ground-truth measurements, aircraft and balloon measurements will be made of aerosol, cloud and surface parameters and their radiation characteristics to help validate and make more useful the LITE data.

The P-3B will carry a vast array of scientific instruments from a variety of

-more-

research institutions including NASA Wallops; NASA Goddard Space Flight Center, Greenbelt, Maryland; NASA Langley; NASA Jet Propulsion Laboratory, Pasadena, California; and the University of Massachusetts, Amherst. The instruments include a laser altimeter, radiometers, scatterometers, and lidars.

The Electra will be equipped with a lidar from NASA Langley.

Dave Pierce, NASA Wallops mission manager for the Electra flights, noted that the support of this mission requires constant coordination to intercept the LITE at specific times and points beneath the shuttle's flight path.

In addition, according to NASA Wallops P-3B mission manager Evan Webb, the size of the project makes it a challenge. The P-3B will carry seven different experiments and visit six different places in 10 days.

Both aircraft will begin their measurements during orbit 22, departing Wallops, flying to Bermuda and then on to Barbados. The Electra will then intercept LITE over Venezuela during orbit 47 and return to Barbados.

The P-3B will again pick up LITE during orbit 53 flying from Barbados to Ascension Island. During orbit 84, it will fly from the Ascension Islands to Cape Town, South Africa. The Electra will underfly Discovery during orbit 85 when the aircraft returns to Wallops from Barbados via Bermuda.

The P-3B will complete its final LITE support flight during orbit 115, taking the aircraft from Ascension to the Azores. Meanwhile, the final Electra flight will be during orbit 117. The aircraft will depart Wallops, fly to Oshkosh, Wisconsin and return.

Following its LITE support, the P-3B will conduct remote sensing observations of several areas in the Azores including the topography of the eroding Capelhinos volcanic cone at the western tip of Faial (Azores). The principal instruments for these observations are an altimeter and radiometer provided by NASA Goddard.

- End -

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For Release:

RELEASE NO. 94-091

LANGLEY STORY OPPORTUNITIES -- SEPTEMBER 1994

U.S./RUSSIAN SPACE COOPERATION TOPIC OF TALK SEPT. 7. Space Shuttle astronaut Kenneth S. Reightler Jr. will visit NASA Langley Sept. 7 at 2 p.m. to share his insider's view of the first joint U.S./Russian space shuttle mission, flown earlier this year. Reightler, a Virginia Beach native, served as pilot on the historic mission. Russian cosmonaut Sergei Krikalev, a veteran of long-duration space flights aboard the Russian MIR Space Station, was the first cosmonaut to fly on a U.S. space shuttle. Location of the talk is the H.J.E. Reid Conference Center, 14 Langley Blvd. News conference at 1:15 p.m.
PUBLIC AFFAIRS CONTACT: Cathy Watson (804) 864-6122

LANGLEY'S LASER PROBE SET FOR LAUNCH. NASA Langley's Lidar In-space Technology Experiment (LITE) is scheduled for launch aboard Space Shuttle Discovery Sept. 9 or after as part of the STS-64 mission. The LITE mission is the first demonstration of a highly-capable new tool for probing the atmosphere. It will show how lasers can greatly increase the accuracy and frequency of cloud and particle measurements in the atmosphere for better understanding of weather and climate. Resource materials available, including graphics, photos, video animation.
PUBLIC AFFAIRS CONTACTS: Keith Henry or Cathy Watson (804) 864-6124/2

STUDENT EXPERIMENT READY TO GO. A group of Norfolk public schools are anxiously awaiting the launch of STS-64/Discovery Sept. 9 or after (also see above). The students are participating in the Norfolk Public Schools Science and Technology Advanced Research (NORSTAR) program which has prepared an experiment to be flown on the space shuttle. The experiment will visually record how sound affects dust particles in near-zero gravity, contributing to a better understanding of acoustics.
PUBLIC AFFAIRS CONTACT: Cathy Watson (804) 864-6122
NORFOLK PUBLIC SCHOOLS CONTACT: Joy Young (804) 441-5633

- more -

LASE UPDATE:

FLIGHT TESTS SET TO BEGIN. A NASA ER-2 high-altitude observation airplane is due to arrive at NASA Goddard-Wallops Flight Facility the week of Sept. 6 for the first in a series of flights to test a new weather instrument. The instrument, part of a NASA Langley experiment, will measure water vapor and suspended particles in the atmosphere to help scientists track weather fronts and learn about the Earth's evaporation and precipitation cycle. LASE is short for Lidar Atmospheric Sensing Experiment. Interview available.
PUBLIC AFFAIRS CONTACT: Cathy Watson (804) 864-6122

STS-68 UPDATE:

'MAPS' LAUNCH TENTATIVELY RESCHEDULED FOR OCTOBER. Langley's MAPS experiment, originally scheduled to fly on STS-68 in mid-August, has been tentatively rescheduled for launch the week of Oct. 2. The experiment is designed to measure carbon monoxide in the lower atmosphere around the world at different latitudes and seasons to determine the pollution effects of biomass burning. Widespread burning in the South American Amazon region and the African savannahs are major global sources of carbon monoxide. MAPS is short for Measurement of Air Pollution from Satellites.
PUBLIC AFFAIRS CONTACT: Cathy Watson (804) 864-6122

- end -

NASA News

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For Release:

September 3, 1994

RELEASE NO. 94-093

LITE Story Opportunities #1
Geographical -- USA

Quick Look: The nine-day Lidar In-space Technology Experiment (LITE) mission aboard the Space Shuttle Discovery (STS-64) will help scientists study the Earth's atmosphere and surface from the global perspective of space. The LITE instrument will send pulses of laser light (at three wavelengths) down into the atmosphere. The laser light will reflect off water droplets and ice crystals in clouds, small particles in the atmosphere called aerosols, and the surface. The LITE mission will help scientists better understand our atmosphere and demonstrate the ability of spaceborne lidar to provide crucial data for Earth science studies.

Wallops Island, Va.: Aircraft Underflights of the LITE instrument. Two of the five aircraft supporting the LITE mission are from the NASA Goddard-Wallops Flight Facility, Wallops Island, Va. The NASA Electra and P-3B will have electronic instruments aboard, including laser systems similar to the LITE instrument, which will measure several atmospheric variables. During the mission these two NASA aircraft will underfly the Space Shuttle Discovery and the LITE instrument. The aircraft data will be used to validate the LITE measurements made from the Space Shuttle.
WALLOPS CONTACT: Keith Koehler, (804) 824-1579.

Hampton, VA: Ground-based Laser Measurements in Support of LITE. Three ground-based laser systems similar to the LITE instrument will be making atmospheric measurements as the Space Shuttle Discovery passes overhead hours after launch. The instruments, based at the NASA Langley Research Center, Hampton, Va., will measure small particles in the lower and middle atmosphere called aerosols, and cloud characteristics such as altitude and depth. These ground-based aerosol and cloud measurements will be used to confirm the accuracy of coincident LITE measurements.

Big Sur to Baja: A Space-Based Study of Regional Aerosols. The LITE instrument will study man-made and naturally occurring particles suspended in the atmosphere (called aerosols) from Southern California to the Baja Peninsula of Mexico. LITE will show the distribution and sources of these aerosols and how far they extend from Southern California. The LITE measurements will be made in conjunction with an instrumented aircraft (Convair 580) from Atmospheric Environment Service, Canada.
AES CONTACT: Heather Mackay, (416) 739-4555.

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Coastal California: Marine Stratus Clouds. Marine stratus clouds are widespread, low, bright clouds over the ocean which reflect sunlight, preventing it from heating the ocean below. This effect helps maintain the Earth's comfortable climate. Scientists are very interested in marine stratus clouds because studies have shown that a small increase or decrease in the amount of oceanic area covered by this type of cloud can have a large effect on the long-term weather of the Earth.

White Sands, New Mexico: LITE Surface Calibration Tests. As the Space Shuttle flies over the White Sands National Monument, the LITE instrument will measure the surface reflectivity of the area. The LITE measurements will be calibrated by comparing them to ground-based measurements made at White Sands by researchers from the University of Arizona. After the calibration is established, other LITE measurements can be used for sites around the world.

Western U.S.: Density, Temperature, Aerosol, and Cloud Measurements. Several ground-based laser systems throughout the western U.S. will be making the same measurements as the LITE instrument. These atmospheric measurements will be compared to the LITE data to confirm the space-based measurements. These ground-based laser systems are located in Pasadena, California; Boulder, Colorado; Rollinsville, Colorado; Mauna Loa, Hawaii; Albuquerque, New Mexico; Tulsa, Oklahoma; Logan, Utah; Hampton, Virginia; and Laramie, Wyoming.

Grand Canyon: Surface Measurements Across the Western Section. The LITE instrument will make measurements of the surface over the western section of the Grand Canyon for comparison to ground-based measurements.

Mauna Loa, Hawaii: Studying Natural and Man-Made Atmospheric Aerosols. LITE will observe man-made and naturally occurring particles suspended in the atmosphere (called aerosols) over the Hawaiian Islands. The LITE data will show the distribution and sources of these aerosols and how far they extend away from Hawaii. Simultaneous laser measurements will be made at the Mauna Loa research site.

Gulf of California and Lake Michigan: LITE Water Reflectivity Studies. LITE will be used to study the reflectivity of water surfaces under varying surface conditions. The LITE measurements will help scientists understand how the reflected laser light is affected by the angle at which the laser beam initally strikes the surface - this information is very important to the designers of future space-based lidar systems which will have lasers that scan from side to side.

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NASA News

National Aeronautics and
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For Release:

September 3, 1994

RELEASE NO. 94-094

LITE Story Opportunities #2
Geographical -- International

Quick Look: The nine-day Lidar In-space Technology Experiment (LITE) mission aboard the Space Shuttle Discovery (STS-64) will help scientists study the Earth's atmosphere and surface from the global perspective of space. The LITE instrument will send pulses of laser light (at three wavelengths) down into the atmosphere. The laser light will reflect off water droplets and ice crystals in clouds, small particles in the atmosphere called aerosols, and the surface. The LITE mission will help scientists better understand our atmophere and demonstrate the ability of spaceborne lidar to provide crucial data for Earth science studies.

Coastal South America and Africa: Marine Stratus Clouds. Marine stratus clouds are widespread, low, bright clouds over the ocean which reflect sunlight, preventing it from heating the ocean below. This effect helps maintain the Earth's comfortable climate. Scientists are very interested in marine stratus clouds because studies have shown that a small increase or decrease in the amount of oceanic area covered by this type of cloud can have a large effect on the long-term weather of the Earth.

Saudi Arabia, the Western Sahara, and Australia: A Space-Based Study of Regional Dust Transport. The LITE instrument will study desert dust/sand in the atmosphere over Saudi Arabia, the western Sahara, and Australia. Dust storms often blow sand from the Sahara into the Atlantic Ocean and Saharan sand has been found in the Caribbean. The LITE data will help scientists study this phenomena and help them better understand how the atmosphere transports small particles. Scientists believe these small particles have the potential to reduce the extent of Greenhouse warming by reflecting sunlight back into space before it has a chance to warm the Earth's surface.

South America and southern Africa: A Space-Based Study of Biomass Burning. LITE will measure both man-made and naturally occurring particles suspended in the atmosphere (called aerosols) across South America and southern Africa. One of the largest sources of aerosols in these regions is biomass burning which occurs most frequently in the dry season (July-September). LITE will show the distribution and sources of these aerosols and how far the aerosols are transported from their source.

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The Himalayas and Andes Mountains: LITE Surface Calibration Tests. As the Space Shuttle flies over the Himalayas and the Andes, the LITE instrument will measure the light reflected off the snow- and ice-covered surfaces. The LITE measurements will give scientists valuable information about how space-based lasers reflect off snow- and ice-covered surfaces. This data is very important for the engineers who will be designing future space-based laser systems to study the Earth's atmosphere.

Andes Mountains: Atmospheric Gravity Waves over Mountains. The LITE instrument was designed to detect small waves in the atmosphere by measuring changes in atmospheric density. One type of wave, called a gravity wave, can form as air flows over a mountain. Gravity waves are similar to the waves which form when a pebble is dropped in water, except gravity waves move upward not outward. Gravity waves can have a large effect on the motion of the atmosphere. Scientists need to better understand how relatively small effects like gravity waves affect the large-scale motion of the atmosphere so future weather prediction models can be made more accurate.

World-wide: Density, Temperature, Aerosol, and Cloud Measurements. Dozens of ground-based laser systems around the world will be making the same measurements as the LITE instrument. These atmospheric measurements will be compared to the LITE data to confirm the space-based measurements. The ground-based laser systems include sites in Melbourne, Australia; Sao Paulo, Brazil; Sofia, Bulgaria; North York, Ontario, Canada; London, Ontario, Canada; Anhui, China; Garmisch-Partenkirchen, Germany; Munich, Germany; Pune, India; Tsukuba, Japan; Frascati, Italy; Tomsk, Russia; Chung-li, Taiwan; and Lauder, New Zealand. Additional laser systems will be operated from sites in Argentina, Canada, China, France, Germany, India, Japan, Korea, New Zealand, Puerto Rico, Russia, Switzerland, and the U.S.

Western Europe: Aircraft Underflights in Support of LITE. A Fokker F27 from France and a Falcon 20 from Germany are two of the five international aircraft underflying the LITE experiment. Each aircraft will have electronic instruments aboard, including laser systems similar to the LITE instrument, which will measure several atmospheric variables. During the mission these two aircraft will underfly the Space Shuttle Discovery and the LITE instrument as it passes over western Europe. The aircraft data will be used to validate the LITE measurements made from the Space Shuttle.

Western Pacific: Thunderstorm studies over the warm Pacific waters. In the western Pacific near Indonesia there is a region of warm ocean waters where large thunderstorms form on a regular basis - this region is known as the Pacific Warm Pool. These frequent disturbances are often topped by a large shield of high ice clouds which can get blown away from the area of the original disturbance. The high ice clouds, called cirrus clouds, can block sunlight which could cause the ocean surface to cool over a long time period.

The Pacific Ocean and the Caspian Sea: LITE Water Reflectivity Studies. LITE will be used to study the reflectivity of water surfaces under varying surface conditions. The LITE measurements will help scientists understand how the reflected laser light is affected by the angle at which the laser beam initially strikes the surface. This information is very important to the designers of future space-based lidar systems which will have lasers that scan from side to side.

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LITE Story Opportunities #3
Science

Quick Look: During the nine-day mission of the Space Shuttle Discovery (STS-64) in September, the Lidar In-space Technology Experiment (LITE) will collect a unique global data set of atmospheric measurements. These measurements will help scientists better understand how humans are affecting the Earth's present and long-term weather.

Clouds: How They Affect the Earth's Long-Term Weather. Clouds affect the amount of sunlight which reaches the Earth's surface as well as the amount of heat which is released by the Earth and its atmosphere into space. LITE will measure cloud characteristics by sending pulses of laser light down into the atmosphere which will reflect off the water droplets and ice particles in clouds. This will provide scientists with a unique collection of global measurements which can improve the computer models used to predict the long-term weather of the Earth.

Aerosols: Tracking Small Particles in the Lower Atmosphere. The LITE laser beam reflects off small particles in the atmosphere called aerosols. Aerosol sources include ash from forest fires, agricultural burning, and volcanic eruptions; haze from various natural and man-made processes; desert sand storms; and sea salt from the oceans. Scientists already know a great deal about the aerosols themselves but have very little information on how far aerosols are moved from their source regions by the wind. The LITE measurements will be used to show where and how far aerosols move and will help scientists better understand the atmosphere

Ozone Destruction: Tracking Small Particles in Upper Atmosphere. LITE will measure small particles called aerosols in the middle atmosphere (stratosphere). Stratospheric aerosols have been linked to the destruction of the ozone layer over the Antarctic (the "Ozone Hole") and are also believed to destroy the protective layer of stratospheric ozone globally. The LITE measurements will help scientists better understand how stratospheric aerosols are transported into the lower atmosphere and where they go once there.

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RELEASE NO. 94-095

Atmospheric Waves: Detecting Small Waves from Space. The LITE instrument was designed to detect small waves in the atmosphere by measuring changes in atmospheric density. One type of wave, called a gravity wave, can form as air flows over a mountain. Gravity waves are similar to the waves which form when a pebble is dropped in water, except gravity waves move upward not outward. Gravity waves can have a large effect on the motion of the atmosphere. Scientists need to better understand how relatively small effects like gravity waves affect the large-scale motion of the atmosphere so future weather prediction models can be made more accurate.

Planetary Boundary Layer: Understanding the Atmosphere Around Us. LITE will provide valuable information on the lowest layer of the atmosphere called the Planetary Boundary Layer (PBL). The PBL extends from the surface to approximately one mile. This layer is important because it transports heat and energy from the surface of the Earth to the rest of the atmosphere.

International Ground-Based Instruments Support LITE Mission. In addition to the LITE measurements from the Space Shuttle, scientists around the world will make atmospheric measurements at nearly 100 ground sites in approximately 20 countries. These global measurements will be used to verify the space-based LITE atmospheric measurements. Ground stations include locations in the U.S., Canada, Europe, South America, Asia, and the Pacific.

International Airborne Measurements Support LITE Mission. Five international aircraft carrying laser systems similar to the LITE instrument will underfly the Space Shuttle during STS-64. The five research aircraft include four turbo-props, the NASA Electra and P-3B from the NASA Goddard-Wallops Island Flight Facility, a Convair 580 from the Atmospheric Environment Service, Canada, and a Fokker F27 from Service d'Aeronomie, France, as well as a Falcon 20 jet from DIR, Germany.

Shuttle to Perform Unique On-Orbit Maneuvers. Two shuttle maneuvers, the Landmark Track Maneuver and the Cross-Track Maneuver, will be performed by the astronauts at selected times during the mission. These roll maneuvers will change the angle at which the LITE laser pulses strike the atmosphere and the Earth's surface, and simulate the scanning function of a future space-based laser system. Both maneuvers will provide engineers with valuable data for the construction of future, satellite-based laser systems. In addition, scientists will gain valuable data on the effects of the angle at which the laser light strikes clouds, aerosols, and the Earth's surface.

Future Lidars in Space. The LITE instrument is the first lidar (LIght Detection and Ranging) system to ever fly in space. The information gained from LITE will help engineers design future space-based laser systems which will be smaller and require less power. These future laser systems aboard permanent satellites will make global atmospheric measurements of aerosols and clouds on a daily basis.

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LANGLEY STORY OPPORTUNITIES -- OCTOBER

LANGLEY PUTS POLLUTANT GAS ON THE MAP. The Space Shuttle Endeavour was launched Sept. 30 on a 10-day mission, carrying an instrument devoted to finding pockets of carbon monoxide in our lower atmosphere (approx. 2 - 10 miles above the Earth's surface). Since MAPS (Measurement of Air Pollution from Satellites) also flew in April, scientists are eagerly anticipating this opportunity to study seasonal differences in the global distribution of carbon monoxide. Carbon monoxide is a colorless, odorless gas created by the burning of fossil fuels such as gasoline and by the burning of forests and grasslands. Interviews available.
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122/4

OCTOBER COLLOQUIUM: INNOVATIONS IN MATERIALS SCIENCE. How materials science and engineering link together all avenues of tangible human endeavor will be the topic of NASA's Oct. 4 colloquium at 2 p.m. The co-founders of the Materials Science and Engineering Dept. at Johns Hopkins University and a principal engineer from Baltimore Gas and Electric Company will include examples in old as well as new art and science. Location is the H.J.E. Reid Conference Center, 14 Langley Blvd. A 1:15 p.m. press conference proceeds the talk.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

'PLASTIC' PLANE CRASH TESTED. The first of at least four 'plastic' aircraft have been test-crashed at NASA Langley. An all-composite two-engine business aircraft was guided through a controlled impact to study how advanced lightweight material structures react in a typical crash. Data was also gathered to improve floor structures, energy-absorbing seats and airbags for designers of future general aviation aircraft. Lightweight graphite fiber and epoxy composite materials are increasingly being used in the manufacture of aircraft, but this is NASA's first full-scale structural crash test of a "high-tech" composite general fuselage. The test was recently conducted at Langley's Impact Dynamics Facility. Photo available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

NASA PARTICIPATES IN COMMUNITY NETWORKING EFFORT. NASA Langley has joined forces with academic, business and civic organizations to establish SEVAnet, the Southeastern Virginia Network. SEVAnet will join computers in the 10 cities and five counties of the Hampton Roads area and is intended to promote economic development through business cooperation and technology transfer. Member organizations include Christopher Newport University, the Hampton Roads Planning District Commission and the Virginia Aerospace Business Roundtable.
PUBLIC AFFAIRS CONTACT: Kerry Mitchell (804) 864-3625 or 864-6124

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10th ANNIVERSARY OF THE EARTH RADIATION BUDGET SATELLITE. On October 5, 1984 the Earth Radiation Budget Satellite (ERBS) was deployed from the Space Shuttle Challenger (STS-41G) by Astronaut Sally Ride. Ten years later Langley scientists are still gleaning information from the two instruments aboard ERBS: the Earth Radiation Budget Experiment (ERBE) and the Stratospheric Aerosol and Gas Experiment II (SAGE II).
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122

ERBE: UNDERSTANDING THE EARTH'S CLIMATE. The ERBE instrument is part of a three satellite system designed to study the exchange of energy between the Sun, the Earth and space. After 10 years in space, the instrument continues to provide scientists with invaluable information about the amount of energy the Earth receives from the sun, what happens to that energy in the atmosphere, and the amount of energy emitted, or reflected, by the Earth and atmosphere back into space.

SAGE II: UNDERSTANDING THE EARTH'S STRATOSPHERE. The SAGE II instrument measures the concentration of suspended particles (called aerosols) in the stratosphere, as well as stratospheric ozone concentrations. The SAGE II data has been used to study the Antarctic ozone hole, the effects of volcanic aerosols on long-term weather, and the depletion of stratospheric ozone. The SAGE II data continues to provide scientists with important data on chemicals in the stratosphere, the movement of suspended particles in the stratosphere, and the transfer of energy between the upper and lower atmosphere.

LASE UPDATE

LASE, LITE AND AIRCRAFT GO FOR 'GRAND SLAM.' Atmospheric scientists hit a "lidar grand slam" Sept. 16 when three lidars made simultaneous atmospheric measurements under the path of the shuttle carrying the fourth lidar, Langley's Lidar In-space Technology Experiment (LITE). Lidar stands for light detection and ranging and operates like an "optical radar." The LASE flight test represents the first remote measurements of water vapor, suspended particles and clouds using an independent lidar. LASE flew on NASA Ames' ER-2 high-altitude observation aircraft which took off from NASA's Wallops Island facility.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

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For Release:

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804/864-6124

October 6, 1994

Barbara Selby
Headquarters, Washington, D.C.
(Phone: 202-358-1983)

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LANGLEY AND FORD SIGN TECHNOLOGY TRANSFER AGREEMENTS

NASA's Langley Research Center, Hampton, Va., and Ford Motor Company, Dearborn, Mich., have agreed to a two-year cooperative agreement for the transfer of NASA-developed technology that will improve the design and engineering of Ford vehicles.

"This is a perfect example of NASA-developed technology being used to enhance the competitive advantage of a major U.S. industry," said Dr. Woodrow Whitlow, Jr., director of the Critical Technologies Division, Office of Aeronautics.

NASA and Ford designated eight technology areas after assessing more than 60 Langley technologies. These technologies will include computational fluid mechanics, flow measurement techniques, antenna measurements and advanced materials to improve manufacturing processes.

This memoranda of agreement is the first broad technology transfer process between NASA and any automotive manufacturer. In addition, the agreement allows Ford to continue development of Langley technologies for application after the program's two-year duration. Some of the continuing developments will be performed at Ford and some will be performed at Langley.

Paul F. Holloway, director of Langley, led the NASA delegation in the signing ceremony at the Ford Motor Company in Dearborn. The Ford delegation was led by David F. Hagen, general manager of Alpha Simultaneous Engineering, Technical Affairs.

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NASA News

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LANGLEY STORY OPPORTUNITIES -- NOVEMBER

NEW PIECE OF OZONE HOLE PUZZLE. For the first time, scientists have measured the concentrations of several chemicals in the Antarctic stratosphere that are believed to control the destruction of stratospheric ozone. In a paper published in the Journal of Atmospheric Sciences October 15, two Langley scientists discussed how these new satellite measurements lend credence to the theory that the Antarctic ozone hole is caused by chemical reactions in the stratosphere. Interview available.
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122

IN SEARCH OF WAKE VORTEX KNOWLEDGE AT MEMPHIS. NASA Langley is embarking on the first of several multi-week deployments to an airport to collect data on wake vortex as part of a joint FAA-NASA program aimed at safely increasing capacity at major airports around the country. Wake vortices are rotating, high-energy tornadoes that spiral behind and downward from the wing tips of aircraft which can disturb following aircraft if they follow too closely. Langley researchers will join forces with MIT Lincoln Laboratory at Memphis-Shelby County Airport for aircraft wake and atmospheric measurements. Interview available.
PUBLIC AFFAIRS CONTACT: Mike Finneran (804) 864-8150

PIONEERING AVIATION RESEARCH SUBJECT OF LECTURESHIP. Dr. Richard T. Whitcomb, winner of the coveted Collier Trophy for greatest achievements in aviation in America, has been chosen for the biennial Jacobs Lectureship Award. In the inaugural Eastman Jacobs Lecture Nov.14 at the Langley H.J.E. Reid auditorium, Whitcomb will discuss his pioneering aviation research. As a Langley researcher from 1943 until his retirement in 1980, Whitcomb worked to improve the performance of aircraft traveling close to the speed of sound. The lecture is open to the public and Whitcomb will be available for media interviews from 1:15 to 1:45 p.m.
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122

DISCOVERY/LITE ASTRONAUT TO SPEAK AT LANGLEY. A member of the crew of the Space Shuttle Discovery (STS-64) will visit Langley Research Center Nov. 28 to present highlights of the recent mission. The Langley-developed Lidar In-space Technology Experiment (LITE) flew aboard STS-64 in September. LITE is the first civilian laser system to fly in space for studies of the atmosphere. The astronaut crew member will discuss the LITE experiment and other aspects of the STS-64 mission, including the first un-tethered space walk in 10 years.
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122

AGREEMENT: FORD MOTOR WILL USE AEROSPACE TECHNOLOGY. NASA Langley and Ford Motor Company have agreed to a two-year cooperative effort to transfer NASA-developed technology that will improve the design and engineering of Ford vehicles. Ford selected 10 technology areas after assessing more than 30 NASA Langley technologies judged to have high potential for use by the automotive group. Interview available.
FORD PUBLIC RELATIONS CONTACT: Amit Ghosh (313) 390-2311
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122

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NASA News

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Release No. 95-005

Langley Story Opportunities - February

CONTACT LENS EXPERIMENT TO FLY ON SHUTTLE DISCOVERY (STS-63). The Langley Gas Permeable Polymeric Materials (GPPM) experiment is scheduled to fly aboard the Space Shuttle Discovery (STS-63) in February. This will be the second flight for the GPPM experiment, designed to study the effects of microgravity on plastics. The previous shuttle experiment in July 1993 (STS-57) showed that plastic to be more uniform and permeable than those produced on Earth. The plastic produced on this mission will be studied for use in extended wear contact lenses. Launch is scheduled for 12:51 a.m., Feb. 2; landing 7:05 a.m. Feb. 10. Telephone-only interviews available during mission.
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122/4.

NASA BUDGET BRIEFING FEB. 6. NASA Administrator Daniel Goldin will present the NASA budget request for FY 96 via NASA TV Feb. 6 at 2 p.m. Reporters are welcome to view the presentation in the NASA Langley Newsroom. Text will be available in the Newsroom by the time of the briefing. The Newsroom is located in B.1202 (formerly the Visitor Center building), Room 132, 5 N. Dryden Street. Newsroom phone 864-9750/51/52.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

FEBRUARY DISCUSSION - TALKING TO COMPUTERS. Dr. Victor Zue, associate director of the Massachusetts Institute of Technology's Laboratory for Computer Science, and head of its Spoken Language Systems Group, will present an overview of recent research at MIT on the development of interfaces which allow humans to speak with computers. The talk will take place at 2 p.m. Feb. 28 at the H.J.E. Reid Conference Center, NASA Langley. Over the past few years, Zue's group has pioneered the development of systems that enable a user to interact with computers using spoken languages. Photo, interview opportunities available.
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122.

TEACHER FOR A DAY. Area students will be treated to classroom presentations from NASA Langley scientists and engineers during National Engineers Week, Feb. 19-25. Goal of this educational outreach program is to impress upon students the importance of studying math and science in an increasingly technological world. Nearly 200 NASA Langley volunteers have already signed up for classroom duty. More than 400 requests have been made from school systems for the classroom presentations.
PUBLIC AFFAIRS CONTACT: Cathy Schauer (804) 864-3306

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TEAM TO STUDY 800-PASSENGER FLYING WING CONCEPT. Technical work on a $3 million, three-year study of an unusual "super" jumbo jet concept was kicked off Jan. 17-18 at NASA Langley. The concept, called the blended-wing-body, would be shaped like a multi-deck flying wing instead of the conventional transport (wing, tail, cylindrical fuselage) and carry 800-900 passengers. The industry-university-NASA team thinks the novel configuration has promise to improve aircraft efficiency, reduce ticket prices for mass transportation and reduce airport congestion on high traffic routes. Team members are McDonnell Douglas Aerospace-Long Beach, Stanford University, University of Southern California, University of Florida, Clark-Atlanta University, and NASA Lewis and Langley Research Centers. Interview available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

ENHANCING AIRWORTHINESS OF AGING AIRPLANES. NASA Langley and a private company have teamed up to develop and market a device that will help improve the airworthiness of the nation's aging airplanes. The "Crack Finder" is a compact, hand-held instrument and probe designed for rapid scanning of metal surfaces to detect surface-breaking cracks. Krautkramer Branson (KB), a subsidiary of the Emerson Electric Co., was to make its first delivery of the Crack Finder in late January 1995, less than six months after licensing the enabling technology from Langley and only 11 months after being selected as the center's industry partner to commercialize the technology.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150

TECHNOLOGY FOR BETTER SOLAR ARRAYS LICENSED TO PRIVATE FIRM. NASA Langley has licensed to a Massachusetts company technology that is likely to result in spacecraft solar arrays and thermal insulation blankets that are more resistant to erosion in space. Other applications could include flame-resistant fibers and corona-resistant wire coating. This atomic oxygen-resistant polymer technology has been licensed to Triton Systems Inc. of Chelmsford, Mass., which initially plans to market the materials for space applications.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150

LANGLEY RESEARCH CENTER WORLD WIDE WEB (WWW) HOME PAGE. The Langley Research Center Home Page can be accessed with any WWW browser software by opening URL: http://mosaic.larc.nasa.gov/larc.html. The Langley WWW Home Page provides pointers to and information regarding Langley Technology Access services, Langley research groups, and specific Langley research projects such as the (GPPM) experiment (see top p.1).
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122.

LOOKING AHEAD:

SATELLITE STABILIZING SYSTEM TO BE TESTED ON SHUTTLE ENDEAVOUR (STS-67). The Middeck Active Control Experiment (MACE) is scheduled to fly aboard the Space Shuttle Endeavour in early March. MACE will help engineers design future satellites that will have minimal vibration, improving the stability of Earth-monitoring satellites and astronomical instruments. The technology already has many applications, to include aircraft gust alleviation, computer disk drive head vibration suppression and noise control. Interview, photos available.
PUBLIC AFFAIRS CONTACT: Catherine Watson (804) 864-6122.

PUT "TOPS" ON YOUR CALENDAR. NASA Langley's second Technology Opportunities Showcase (TOPS) will be held April 6-8 at NASA Langley Research Center, Hampton, Va. This business expo invites American industry -- aerospace and non-aerospace alike -- to profit from government research and innovations. Final day open to public.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

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NASA News

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NASA Langley Story Opportunities - March

LANGLEY EXPERIMENT SET TO FLY ON SHUTTLE. Future satellites may have minimal vibration -- improving the stability of Earth-monitoring satellites and astronomical instruments -- due to a NASA Langley experiment to be launched on Space Shuttle Endeavour March 2. The satellite stabilizing system concept is called the Middeck Active Control Experiment, or MACE. The technology already has many applications, to include aircraft gust alleviation, computer disk drive head vibration suppression and noise control. Interview, photos available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124.

MARCH DISCUSSION - 21st CENTURY AUTO TECHNOLOGY. Robert N. Culver, research planning manager for Ford Motor Co., will discuss "Automotive Technology for the 21st Century" at a colloquium at 2 p.m. March 7 in the H.J.E. Reid Conference Center. Culver will discuss the four factors he believes will drive technological changes in automobile design in the next century. The colloquium begins at 2 p.m., with a media briefing at 1:15 p.m. in the Wythe Room of the H.J.E. Reid Conference Center, 14 Langley Blvd., Hampton, Va.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

HIGH-TECH BUSINESS OPPORTUNITIES AT "TOPS." The second Technology Opportunities Showcase (TOPS) will be held April 6 through 8 at NASA Langley Research Center in Hampton, Va. This business expo invites American industry – aerospace and non-aerospace alike – to profit from government research and innovations. The final day is open to the public. A sampling of the technology transfer stories that will be found among the 150 TOPS exhibits is listed below.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

TOPS SAMPLER:

Converting deadly carbon monoxide: A new class of catalysts capable of converting deadly carbon monoxide to carbon dioxide has been developed by Langley researchers. The catalysts were developed for laser research, but have other uses. Rochester Gas & Electric of Rochester, N.Y., is using the technology for a system to remove carbon monoxide from home air-circulation systems. The Mantic Corp. of Salt Lake City, Utah, wants to use the catalysts in gas masks for airplanes. Several fire departments are interested in similar gas masks for

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firefighters. And the Science & Technology Corp. of Hampton, Va., hopes to use the catalysts to extend the life of their carbon dioxide lasers.

Quick scaffolding: Space technology developed at Langley is providing industry with flexibility in the realm of high-risk repair. The technology, quick-attachment joints, was produced for astronauts assembling high-precision structures in space. Virginia Power, Newport News Shipbuilding and Westinghouse-Hanford have expressed interest in making scaffolding systems that use the quick-attachment joint. And Avibank MFG Inc., of Burbank, Calif., signed an agreement with Langley to conduct a marketing and production study of the technology.

Build missiles, repair ships: Technology developed at Langley is helping a ship repair firm diversify its offerings to customers. The Tecnico Corp., a small disadvantaged business in Chesapeake, Va., learned about the technology, a rubber-tooling process, at the 1993 TOPS. Tecnico already has applied the process to the repair of a Navy submarine and has received an order to produce composite components for defense missiles.

Safer surfaces: Imagine yourself able to travel along slick highways without worrying about your car sliding off the road. Or walking on your swimming pool pavement without slipping and hurting yourself. Langley's innovative pavement grooving technology already has helped to reduce the number of highway accidents. Injuries from wet surfaces on swimming pool decks, playgrounds and work areas in refineries, factories, and meat-packing facilities also are down. Langley has partnerships with industry and academia to commercialize pavement-related technology and help meet the nation's transportation needs.

Safer airplanes: Langley and a private company have teamed up to develop and market a device that will help improve the airworthiness of the nation's aging airplanes. The "Crack Finder" is a hand-held instrument designed for rapid scanning of metal surfaces to detect surface-breaking cracks. Krautkramer Branson (KB), a subsidiary of the Emerson Electric Co., was to make its first delivery of the Crack Finder early this year, less than six months after licensing the enabling technology from Langley.

Better solar arrays: Langley has licensed to a Massachusetts company technology that is likely to result in spacecraft solar arrays and thermal insulation blankets that are more resistant to erosion in space. Other applications could include flame-resistant fibers and corona-resistant wire coating. This atomic oxygen-resistant polymer technology has been licensed to Triton Systems Inc. of Chelmsford, Mass., which initially plans to market the materials for space applications.

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Michael Finneran
(804) 864-6120

For Release: March 30, 1995

Release No. 95-034

WHO:	NASA Langley Research Center
WHAT:	Technology Opportunities Showcase (TOPS)
WHEN:	April 6-8, 1995
WHERE:	Hampton, Virginia
WHY:	To help businesses use NASA technology to make them more competitive in the world marketplace.

Special 'TOPS' Langley Story Opportunities

FACT SHEETS ARE AVAILABLE ON EACH OF THESE ITEMS UPON REQUEST

Deadly Gas Removal: Worried about the threat of deadly carbon monoxide gas in your household? New low-temperature oxidation catalysts capable of converting carbon monoxide into harmless carbon dioxide have been developed which will help ease that fear. Originally developed to prolong the life-span of carbon dioxide lasers, the catalysts are finding unforeseen uses. In agreement with Langley, they are being used by industry in gas masks aboard airplanes and for firefighters. Other companies are pursuing agreements to use the catalysts in home air circulation systems.

Controlling Noise: Is home appliance noise becoming a major annoyance to you? Does equipment at your work site make unbearable noise? Researchers at NASA Langley have developed active noise control tools that will help to alleviate these problems. These tools have been produced primarily to reduce noise and vibration in aircraft and rotorcraft, but the technology is expected to transfer into the automotive, industrial and domestic fields as well.

Efficient Information Exchange: Looking for a way to enhance the information transfer ability of your personal computer? Researchers at NASA Langley have developed a low-cost, simple interface circuit capable of transferring information efficiently to and from the computer using a printing port. The interface permits the attachment of several devices to a computer unit and is superior to other interfaces because it is simpler in design and operates faster.

Biological Sensing: Improvements are being added to a new catheter that will give doctors the capability to perform biological sensing within the human esophagus. The improvements are being made on the urodynamic catheter circumferential pressure probe previously displayed at Langley's TOPS '93 exhibition.

Durable Thermoplastics: New generation thermoplastics have been developed at NASA Langley that offer efficiency and versatility to manufacturers. The lightweight cost-effective materials (LaRC™-SI) are resistant to extreme temperatures and harsh environmental conditions that would degrade most conventional plastics. The materials have been incorporated in high-tech items like electronic cable and circuitry.

"Smart" Materials: Revolutionary "smart" materials, known as shape memory alloys (SMAs), are having a profound impact on the way everyday tasks are performed. The small, lightweight and extremely reliable alloys are being considered for the opening and closing of automobile lamps and in scald-protection devices for bathroom showers. SMA technology has already been successfully applied for medical uses.

Explosive Welding: Explosive seam welding, a bonding technique perfected at NASA Langley, is providing industry with the ability to join different metals, alloys and tube-to-tube configurations—a feat virtually impossible to accomplish with conventional joining methods. Sheet stocks of various metals and alloys have been successfully mated with ease, lending further support to the belief that the method will allow companies to complete complex fabrication tasks with greater efficiency. Atomic Energy of Canada is considering using the process for the repair of nuclear reactors.

Quick Facility Repair: Space-proven quick-attachment joint technology, developed at Langley, is helping to make high-risk facility repair easier. Quick-attachment joints were developed for the assembly of high-precision structures in space. Several companies, both local and out-of-state, have expressed an interest in using the unique scaffolding technology for facility repair and maintenance.

Measuring Shear Force: A new means of measuring shear force pressures on joint structures has been invented by researchers at NASA Langley. The technique uses advanced shear force sensors developed from regular fasteners with simple instrumentation. These sensors will provide a new way of measuring the endurance of structures and parts in devices, vehicles and facilities.

Determining Combustibility: Researchers at Langley have perfected a way for consumers to determine the combustibility of certain products. The ignitability test method indicates whether initiators, such as munitions primers, are capable of igniting combustible materials. The method, successfully demonstrated in cooperative studies with the U.S. Army, may be used in the design of gas generators and munitions, and to establish safety and performance standards for commercial products.

Crash Absorption: Structural materials have been developed that will increase passenger survivability in the event of a vehicular catastrophe. The materials are being incorporated in aircraft seat and restraint systems as well as subfloor structures. Plans are being made to apply the technology commercially in crash barriers and railing systems for highways, bridge abutment protectors and new aircraft designs. Automotive companies have expressed interest in the crash absorbing concept.

Ensuring Surface Safety: Thanks to research at Langley, the possibilities of becoming involved in an accident on a slick highway or suffering a major injury on slick pavement are significantly reduced. Advances in pavement grooving technology and its transferal to the commercial sector have helped reduce highway accidents nationwide. Injuries on wet surfaces in work and recreational facilities also are down.

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NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release: May 2, 1995

Release No. 95-042

NASA Langley Story Opportunities - May

BETTER BREAST CANCER DETECTION. Researchers at NASA Langley Research Center have come up with a better way to detect breast cancer by applying technology originally developed to study the atmosphere from space. The technique uses a charged coupled device (CCD) camera similar to those found in home video cameras that will allow physicians to see cancer tissues four times smaller that those visible with X-ray film. It also requires lower levels of harmful X-rays to which patients are exposed.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

COMET COLLOQUIUM. The co-discoverers of Comet Shoemaker-Levy, which produced a series of dazzling data and images when it struck Jupiter last year, will give a talk at 2 p.m. Tuesday, May 16, in NASA Langley Research Center's H.J.E. Reid Auditorium. Drs. Carolyn and Eugene Shoemaker will describe the discovery of the comet, its breakup into more than 20 fragments, its collision with Jupiter over a 10-day period last July, and the significance of the event to humankind. Media are invited to the talk and to a media briefing with the Shoemakers at 1:15 p.m.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

PSB SPACE STATION VIDEO CONFERENCE. NASA Langley researchers are working in conjunction with WHRO TV to produce a video conference entitled "Space Station: It's About Life on Earth." The live, two-hour conference will air May 4 at 1 p.m. EDT. The conference will focus on the effects of microgravity on the human body, the impacts of space research on medical treatments and agriculture, and how materials made in space can help people on Earth. An interactive question and answer period via fax and telephone will follow each segment. Interviews, graphics, video available.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122/3

AEROSPACE SMART MATERIALS WORKSHOP. More than 100 scientists and engineers from industry, government, and universities will meet at NASA Langley May 4-5 to discuss recent advances in "smart" materials. Smart materials are designed to interact with their environment much like the human nervous system, both sensing and communicating. A sensor made with smart materials will know when it's time to turn a machine on or off without human intervention. The workshop will cover topics such as applications in vibration and noise control, high performance smart materials for sensors and actuators and advances in fiber optic technology.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122/3

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COMING ATTRACTIONS

LASER "LITE" RESULTS TO BE DISCUSSED. The results of the September 1994 LITE mission aboard the Space Shuttle Discovery (STS-64) will be presented May 31 and June 1 in a special session at the American Geophysical Union meeting in Baltimore, Maryland. Langley scientists will discuss LITE's measurement of cloud characteristics and the global distribution of small particles in the atmosphere (called aerosols). The LITE mission was the first flight of a lidar (LIght Detection And Ranging) system in space and the first use of a space-based laser for atmospheric remote sensing. Interviews available at the conference with LITE project scientist. Media kits, B-roll video available upon request.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122/3

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release: May 3, 1995

Catherine E. Watson
(804) 864-6122/3

Release No. 95-43

NOTE TO EDITORS

Langley to Host 4th Annual Advances in "Smart" Materials Workshop

Over 100 scientists and engineers from industry, government, and universities will meet at the NASA Langley H.J.E. Reid Conference Center on May 4 and 5 to discuss recent advances in the field of "smart" materials. Smart materials interact with their environment much like the human nervous system, both sensing and communicating. A sensor made with smart materials could know when it's time to turn a machine on or off without human intervention. Smart materials have even been used in the development of a prosthetic arm.

More than 35 technical papers will be presented at the workshop covering topics such as applications in vibration and noise control, high performance smart ceramic, polymer and composite materials for sensors and actuators, advances in fiber optic technology, and smart material modeling efforts. The first session will cover government perspectives and applications and will include an overview of the activities at NASA Langley as well as presentations by representatives of other government laboratories. Posters and demonstrations of research from NASA Langley, universities and industry will be presented in the afternoon of May 4.

The workshop will take place from 8 a.m. to 5 p.m. May 4 and 5. The H.J.E. Reid Conference Center is located at 14 Langley Blvd., NASA Langley Research Center, Hampton, Va. Media wishing to attend the conference should contact Catherine Watson at (804) 864-6122.

- End -

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

For Release: June 5, 1995

Release No. 95-049

NASA Langley Story Opportunities - June

REMINDER ABOUT JUNE 6 TALK. Samuel Pierpont Langley, an innovative astrophysicist and aviation pioneer during the late 1800s and early 1900s, will have his work and career featured at the NASA Langley Colloquium Tuesday, June 6 at 2 p.m. Langley -- after whom the center was named -- is credited with engineering the world's first successful unmanned flights of a heavier-than-air flying machine, known as an "aerodrome." Donald L. Lansing, retired NASA Langley engineer and lecturer on Langley's work, will be the speaker. Media are invited to the talk and to a media briefing at 1:15 p.m., both at the H.J.E. Reid Conference Center, NASA Langley.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122/3

LANGLEY WORKING ON NEXT-GENERATION SPACE VEHICLES. Langley has been asked to draw on its more than 20 years of experience in reusable launch vehicle studies as part of an agency-wide program to produce a new generation of launch vehicles. The Reusable Launch Vehicle (RLV) program calls for development of one or more launch vehicles that could deliver payloads and people to space, fly back to Earth, and be used again. Photos are available of one RLV concept model being tested in a wind tunnel.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

MINORITY-OWNED BUSINESS AGREEMENT REACHED. Langley has entered an agreement intended to transfer technology to minority-owned businesses through a consortium with member companies across the nation. The agreement was signed with the Minority-Owned Business Technology Transfer Consortium, a not-for-profit organization whose member firms are at least 50-percent minority owned. Under the agreement, NASA and the consortium will identify and work with minority firms that are candidates for technology commercialization and partnership opportunities.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

NEW BOOK CHRONICLES NASA LANGLEY'S EARLY SPACE DAYS. "Spaceflight Revolution" is the story of NASA Langley Research Center from Sputnik to Apollo. The 542-page book is expected to be available through the Government Printing Office by the second week in June. The book, NASA SP-4308, was written by the author of the highly-praised "Engineer in Charge" which outlines Langley's aviation and space pioneering efforts between 1917 and 1958.
GOVERNMENT PRINTING OFFICE ORDER DESK: 202-512-1800
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

- more -

TEACHERS GO TO SUMMER SCHOOL AT NASA LANGLEY. NASA Langley scientists and engineers will be the teachers this summer during several training sessions for elementary and middle school teachers. NASA scientists and engineers, along with NASA education specialists, will help the teachers learn more about aeronautics, engineering, atmospheric science and space research during each of the two-week programs. Photo opportunities, interviews with the teachers and NASA participants available.

- **o JULY EXAMPLE** - Since 1987, NASA Langley has conducted NEWEST, a formal teacher training program funded by the National Science Teachers Association. Short for NASA Education Workshop for Elementary School Teachers, NEWEST is for grade K-6 teachers. This year, it will be held July 9-22.

PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122/3

NASA NEWS

National Aeronautics and
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For Release: June 30, 1995

RELEASE NO. 95-56

NASA LANGLEY RECOGNIZED FOR PARAWING RESEARCH

The NASA Langley Research Center and other key organizations and individuals have been recognized for the conception and development of parawing/hang glider technology. The technology was formally inducted into the NASA-United States Space Foundation-sponsored Space Technology Hall of Fame by NASA administrator Daniel S. Goldin and foundation chairman James E. Hill. The induction was part of the 11th National Space Symposium held last month in Colorado Springs, Colorado.

The "parawing," a device possessing the aerodynamics of a rigid wing and the flexibility of a parachute, was conceived by former NACA/NASA Langley researcher Francis Rogallo and his wife, Gertrude, in 1948 as a means of making airplanes cheaper and easier to store. Although the National Advisory Committee for Aeronautics (NACA), the predecessor to NASA, showed no interest in the concept, the Rogallos received permission to obtain a flexwing patent in 1951.

Following an unsuccessful stint in the commercial toy market, the concept captured the interest of leading space program officials in 1958 and was subsequently considered for the role of landing space payloads. Langley began extensive studies testing parawings employed on various space vehicle configurations. Several patents were derived from this research, including rigid keel, as well as inflatable and small, rigid wing edges, and a comprehensive flexible wing data base was evolved from both wind tunnel and flight testing.

NASA ultimately chose not to use the parawing in the space program, relying on conventional parachutes for capsule landings instead. However, the U.S. Army became interested in using the parawing for its airborne deployment forces.

During the mid-1960s, Pioneer Aerospace and Irvin Industries manufactured parawings for the Army Golden Knight precision parachute team which became the first to effectively demonstrate the steering capability of the wings. This success helped to

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spark public interest in the sport of hang gliding, an industry that now generates $50 million annually.

Today, hang gliders can be seen gracing the skies throughout the world and many companies produce parawings, hang gliders and powered gliders (ultra-lights). In the United States, hang glider enthusiasts have formed their own association, the U.S. Hang Gliders Association, and several schools have been created.

Others formally recognized for their contributions to the development of parawing/hang glider technology included Pioneer Aviation Corporation; Irvin Industries; Moyes California, Inc.; Wills Wing, Inc.; Pacific Airwaves, Inc.; and Delwin R. Croom, Rodger L. Naeseth, William C. Sleeman, Jr. and Robert T. Taylor from NASA Langley.

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NASA News

National Aeronautics and
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For release: July 6, 1995

RELEASE NO. 95-60

NASA/FAA ANNOUNCE 1996 GENERAL AVIATION DESIGN COMPETITION

NASA and the FAA are sponsoring a General Aviation Design Competition for students at U.S. aeronautical and engineering universities to address design challenges for general aviation aircraft and related transportation systems.

The competition, in its second year, allows undergraduate and graduate students working with faculty advisors to participate in a national effort to develop technologies for a small aircraft transportation system. The competition also is intended to help raise student awareness of the economic relevance of general aviation and its value for business and personal use. NASA and the FAA want to increase the involvement of the academic community in the revitalization of the U.S. general aviation industry while providing real-world design and development opportunities for students.

Student teams are challenged to develop small aircraft transportation system innovations in one or more of the following technical areas: integrated cockpit systems; propulsion; integrated design and manufacturing; aerodynamics and operating infrastructure. Design packages will be reviewed by a panel of industry and government experts who will provide feedback to the teams.

Design packages are due by May 6, 1996. An award of $5,000 will be given to the university academic department of the first place winner, with $3,000, $2,000, and $1,000 awards respectively given to the first, second and third place design teams.

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Winners will be presented with their awards at the annual Experimental Aircraft Association Fly-In Convention and Sport Aviation Exhibition in Oshkosh, Wisc., in July 1996.

The competition was created in response to NASA administrator Daniel S. Goldin's challenge to tap engineering talent within universities and FAA administrator David Hinson's policy supporting general aviation innovation. The competition is being coordinated by the Virginia Space Grant Consortium, a nonprofit aerospace educational coalition, in Hampton, Va. Copies of competition guidelines can be obtained from the Consortium by phone at 804/865-0726 or fax at 804/865-7965.

General aviation has proven to be an important contributor to the economic well-being of the U.S. Presently, the 212,000 general aviation aircraft in service comprise 62 percent of all U.S. flight hours, 37 percent of all flight miles, and 78 percent of all departures in our country. General aviation provides 540,000 U.S. jobs and $40 billion of economic input annually.

The U.S. general aviation industry, however, has declined steadily over the past 15 years. In 1978, a record number of 18,000 new general aviation aircraft were delivered by U.S. manufacturers. Only 800 deliveries of new general aviation aircraft were recorded last year. Moreover, the typical general aviation aircraft type is about 30 years old and uses old technology. Flight deck systems used on present-day general aviation range from the 1950s to the 1990s, with some piston propulsion systems dating back to the 1950s. Revitalization efforts coordinated between numerous national private and public sector organizations seek to turn these statistics around.

The general aviation revitalization effort is being led by the AGATE (Advanced General Aviation Transport Experiments) Consortium. AGATE was created to enable market growth for inter-city transportation in small aircraft. The AGATE consortium has industry, university and non-profit organizations as members. Twenty-seven states are represented.

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NASA News

National Aeronautics and
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For release: July 6, 1995

RELEASE NO. 95-61

NOTE TO EDITORS: "NASA LANGLEY - FROM SPUTNIK TO APOLLO"

The birth, growth and changes of NASA's Langley Research Center will be addressed by Dr. James R. Hansen, a historian specializing in technology and its impacts on society, July 11 at the H.J.E. Reid Conference Center. Hansen will be discussing his latest book "Spaceflight Revolution: NASA Langley Research Center from Sputnik to Apollo."

"Spaceflight Revolution" covers Langley's many contributions to the United States' space effort, including Project Mercury and the Space Task Group, the origin of lunar-orbit rendezvous, and the development of the world's most reliable launch vehicle. As Hansen traces NASA Langley's many accomplishments, he also analyzes the effects of the nation's rapid shift from air to space on its premier aeronautics laboratory. He examines the effects of such changes as the increasing emphasis on project work at the expense of general research, the sudden exposure of NASA Langley to worldwide scrutiny, NASA's explosive growth and the resulting competition among the agency's centers, and the new reliance on contractors.

Hansen is an alumni associate professor and chairman of the Department of History at Auburn University in Auburn, Alabama, where he has taught since 1986. He served as the official historian for NASA Langley Research Center from 1981 to 1993. He has authored three books on aerospace history, including "Engineer in Charge: A History of the Langley Aeronautical Laboratory, 1917-1958," and over four dozen articles, book chapters and review essays on various technological subjects.

Hansen has served on a number of advisory boards and panels, including the Research Advisory Board of the National Air and Space Museum, the Editorial Advisory Board of the Smithsonian Institute Press, and the Advisory Board for the Archives of Aerospace Exploration at Virginia Tech. Hansen has also served as vice-president of the board of directors of the Virginia Air and Space Center in Hampton, Va.

The colloquium will begin at 2 p.m., with a media briefing at 1:15 p.m. in the Wythe Room of the H.J.E. Reid Conference Center, 14 Langley Blvd., Hampton, Va. Media who wish to attend the briefing should contact Catherine Watson at (804)864-6122.

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OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 1

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NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release: Immediately

Release No. 95-062

NASA Langley Story Opportunities - July

HISTORIAN, AUTHOR TO SPEAK TUESDAY. Dr. James R. Hansen, author of two authoritative books on NASA Langley and the U.S. aerospace program, will speak July 11 on "Langley Research Center Spaceflight: Sputnik to Apollo." Topics to be highlighted include center's role in getting the first humans to the Moon. Media are invited to the 2 p.m. talk and to a media briefing at 1:15 p.m., both at the H.J.E. Reid Conference Center, NASA Langley. Hansen will repeat his presentation at the Virginia Air & Space Center, Hampton, at 7:30 that evening. (See below regarding Hansen's new book.)
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122/3

HANSEN BOOK CHRONICLES NASA LANGLEY'S EARLY SPACE DAYS. "Spaceflight Revolution" is the story of NASA Langley Research Center from Sputnik to Apollo. The 542-page book is now available through the Government Printing Office. The book, NASA SP-4308, was written by Dr. James R. Hansen, the author of the highly-praised "Engineer in Charge" which outlines Langley's aviation and space pioneering efforts between 1917 and 1958. GPO price is $30.
GOVERNMENT PRINTING OFFICE ORDER DESK: 202-512-1800
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

ENGINEERS HELP DISABLED WOMAN. NASA Langley engineers have developed a device that allows a severely disabled woman from Virginia Beach, Va., to communicate using a chin-activated computer mouse.The 26-year-old woman has a degenerative condition and has control only over opening and closing her mouth. With this movement, she can activate a single-switch computer interface, enabling her to select from a menu of choices.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

FLIGHT TESTING FOR NEAR-PERFECT AIR FLOW. NASA Langley researchers are preparing to flight-test a concept designed to improve the aerodynamics of aircraft traveling at supersonic speeds. The experiment will use a special panel installed on the wing of a modified F-16 jet fighter. The panel is designed to create nearly perfect, or "laminar," air flow over the wing. Laminar flow control would enable planes to fly on less fuel and with smaller engines. Successful supersonic laminar flow control could bring the conceptual supersonic airliner of the future closer to reality. Such a plane would fly at 2.4 times the speed of sound, carry

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300 passengers and cost only an 15 to 20 percent more than a normal coach fare.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

PARAWING NAMED TO HALL OF FAME. Pioneering work that led to modern hang gliders and powered ultralight aircraft has been recognized by the U.S. Space Foundation Space Technology Hall of Fame. Former NASA researchers Francis and Gertrude Rogallo topped the list of honorees at the Colorado Springs ceremony. The Rogallos first conceived of the parawing as a means of making airplanes cheaper and easier to store. Described as a device with the aerodynamics of a rigid wing and the flexibility of a parachute, the parawing was briefly considered as a way for the first manned space capsules to glide back to the earth's surface. Interviews available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

- End -

NASA News

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For release: July 18, 1995

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RELEASE NO. 95-63

MCDONNELL DOUGLAS SELECTED TO NEGOTIATE FOR AERONAUTICS CONTRACT

NASA's Langley Research Center, Hampton, Va., has selected McDonnell Douglas Aerospace, Long Beach, Calif., for negotiation of a $160 million contract in support of the Advanced Composites Technology program.

Under the eight-year contract, McDonnell Douglas will design, develop and verify a full-scale composite wing. The wing will be made of a lightweight yet durable material, in place of standard aluminum. If tests are successful, composite wings could be used on commercial aircraft, reducing weight and cost, and meeting safety standards. The work is to be conducted at McDonnell Douglas plants in Long Beach, Huntington Beach, Calif., and St. Louis, Mo., from 1995 to 2002.

The major goals of the contract are to verify innovative new wing technology through design, fabrication and testing of structural elements, sub-components, a 40-foot long semi-span wing component and a full-scale wing box. All new manufacturing technology for composite structures will be directly transferred to other U.S. aircraft builders.

NASA has been developing composite primary wing structures under the Advanced Composites Technology program, which began in 1989. The McDonnell Douglas contract results are expected to provide the technical data for the application of composite wing structures to 21st century commercial transport aircraft.

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NASA press releases and other information are available automatically by sending an Internet electronic mail message to domo@hq.nasa.gov. In the body of the message (not the subject line) users should type the words "subscribe press-release" (no quotes). The system will reply with a confirmation via E-mail of each subscription. A second automatic message will include additional information on the service. Questions should be directed to (202) 368-4043.

NASA News

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RELEASE NO. 95-069

NASA/FAA ANNOUNCE AVIATION DESIGN COMPETITION WINNERS

NASA and the FAA have selected a team from three Kansas universities as joint winners of their first National General Aviation Design Competition for U.S. aeronautical and engineering universities. The joint team was made up of students and faculty from the University of Kansas, Lawrence; Kansas State University, Manhattan; and Wichita State University, Wichita.

The contest challenged teams of undergraduate and/or graduate students, working with faculty advisors, to address design challenges for general aviation aircraft and related transportation systems. The competition was held during the 1994-95 academic year.

For taking first place, the participating academic departments of the joint Kansas team shared a $5,000 award and the student design team members shared a $3,000 award. Their "Shrike" aircraft concept was conceived to introduce advanced operator-friendly technologies that promise to make general aviation flying easier than driving a car. The new series of aircraft would feature advanced flight control systems and a heavily automated, simplified cockpit display and pilot interface system.

Second place and a $2,000 award went to the design team from Embry-Riddle Aeronautical University, Daytona Beach, Fla. Their Aquilas design concept suggested several innovative features to enhance safety and efficiency of general

- more -

aviation aircraft. Features would include improved structural crashworthiness and a deployable parachute.

Third place and a $1,000 award went to Mississippi State University, Mississippi State, Miss., for conducting a study of advanced cockpit and propulsion system concepts that would feature the latest in pilot displays and early warning emergency systems. These systems were designed to replace the older, less efficient systems commonly found in general aviation aircraft today.

An honorable mention went to the UPM Design Group, made up of members from the University of Virginia at Charlottesville, Va., the Pratt Institute at Brooklyn, N.Y., and the Mallen Research Corporation of Charlottesville, Va. The team was honored for its futuristic state-of-the-art aircraft design, which includes an "ergonomically" designed cabin interior providing passengers with access to the latest in onboard computer communication systems.

The design competition was created because NASA and the FAA want to increase the involvement of the academic community in the revitalization of the U.S. general aviation industry while providing real-world design and development opportunities for students.

The competition is now an annual event. It allows university students to participate in a national effort to develop technologies for an aircraft transportation system for smaller aircraft. It is intended to help raise student awareness of the economic relevance of general aviation and its value for business and personal use.

Design packages are reviewed by a panel of industry and government experts who provide feedback to the student teams.

Design packages for the 1995/96 NASA/FAA General Aviation Design Competition are due by May 6, 1996. Winners will be presented with their awards at the annual Experimental Aircraft Association Fly-In Convention and Sport Aviation Exhibition in Oshkosh, Wisc.

The competition is being coordinated by the Virginia Space Grant Consortium, a nonprofit aerospace educational coalition, in Hampton, Va. Copies of competition guidelines can be obtained from the Consortium by phone at 804/865-0726 or fax at 804/865-7965.

- end -

NASA News

National Aeronautics and
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For release: July 29, 1995

RELEASE NO. 95-070

NASA FORMS PARTNERSHIP TO REVITALIZE GENERAL AVIATION

Two years of government-industry cooperation has resulted in the formation of a unique partnership to revitalize the U.S. general aviation industry.

The Advanced General Aviation Transport Experiments (AGATE) consortium was formally established in a signing ceremony today at Oshkosh, Wisc. Participating were NASA, the FAA and industry consortium members. Universities and nonprofit organizations also make up AGATE, one of the larger member consortia of any kind in the U.S.

The purpose of AGATE is to enable market growth for inter-city transportation in small aircraft. AGATE members share resources and risks to make the market "pie" bigger for everyone. Members are committed to developing safer aircraft and more efficient flight systems to improve pilot training and operations in and near congested airports.

This joint government-industry effort is the outgrowth of a meeting between NASA administrator Daniel S. Goldin and several industry members at the Experimental Aircraft Association Convention in Oshkosh, Wisc. in 1992, spurred in large part by the Clinton Administration and Congress' commitment to "reinventing government." The consortium operates under a unique Space Act process called the Joint Sponsored Research Agreement (JSRA). Research conducted under a JSRA eliminates many of the burdensome and time-consuming operations of federal acquisition regulations. Early AGATE results have been impressive in this regard.

- more -

The consortium represents a new "blueprint" to map out this revitalization, according to Dr. Bruce A. Holmes, AGATE's first director and head of NASA's General Aviation Office at NASA Langley Research Center, Hampton, Va. Of AGATE, Holmes said, "It offers industry the ability to work together to undertake tasks of higher risk, with higher payoff, faster speed of technology transfer, control of proprietary and shared technologies, reduced costs and more efficient use of research and development resources."

The agreement is a product of several years of investigation and development by the American Technology Initiative, Inc. (AmTech) of Menlo Park, Calif., a NASA-sponsored, public-benefit, non-profit corporation that facilitates public-private research and development collaboration.

Of the more than 60 consortium members, 31 are companies having total annual revenues of more than $25 billion and 250,000 employees. Consortium members' general aviation output generates $5 billion per year and employs 53,000 people. One purpose of AGATE is to increase revenue and create new jobs in manufacturing, sales, training, service, support and operations industries throughout the nation's small airport infrastructure.

General Aviation—defined as all flying except the military services and commercial airlines—has fallen from its economic heights in the late 1970's to record lows due to outdated technologies, regulatory restrictions, liability burdens and increasing costs.

The AGATE program targets technologies for new operating capabilities in small aircraft including improved bad weather flight systems; emergency avoidance systems that support decision-making; night and low visibility terrain-following systems; traffic avoidance systems; and systems that ease the flight-planning workload, minimize the danger of injuries, and improve comfort, performance and efficiency.

NASA's Small Business Innovation Research (SBIR) Program provides substantial support for the general aviation industry. More than $8 million in contracts have been awarded in 1993 and 1994 to small general aviation companies. Most of these companies have chosen to join the AGATE consortium to leverage their SBIR efforts with other companies.

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NASA News

National Aeronautics and
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Langley Research Center
Hampton, Virginia 23681-0001

For Release: Immediately

Release No. 95-071

NASA Langley Story Opportunities-August

GENERAL AVIATION IS GIVEN NEW LIFE. A network of partnerships between government, industries, universities and nonprofit organizations is breathing new life into general aviation. The official signing ceremony of the AGATE (Advanced General Aviation Transport Experiments) Consortium took place on July 29 in Oshkosh, Wis., home of the Experimental Aircraft Association (EAA) annual Fly-in Convention and Sport Aviation Exhibition. AGATE is a multifaceted organization formed by NASA, FAA and the general aviation industry aimed at increasing revenue and creating jobs.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

10,000 PAGES ALL ON ONE LITTLE DISC. "Legacy," a joint project between the NASA General Aviation Program Office and the NASA Langley Technical Library, is a CD-ROM program for anyone with an interest in the NACA's and NASA's contribution to aviation. It is comprised of the agency's most requested historical and current technical reports on general aviation. Hard copies would cost as much as $3,000, yet the CD-ROM is available for $75 plus $6 for shipping and handling. The disc is available through the National Technical Information Service (NTIS).
NTIS CONTACT: (703) 487-4650
NASA LANGLEY TECHNICAL LIBRARY CONTACT: Susan Adkins (804) 864-2390

*****NASA/FAA CHALLENGE STUDENTS TO INNOVATE IN 1996.** NASA and the FAA are sponsoring a general aviation design competition for aeronautical and engineering students. The competition challenges student teams to develop small aircraft transportation system innovations in various technical areas. The purpose of the competition is to encourage involvement of all members of the aviation community. Design packages are due May 6, 1996, and the winners will be presented in July 1996. Copies of competition guidelines can be obtained from the Virginia Space Grant Consortium.
VIRGINIA SPACE GRANT CONSORTIUM: (804) 865-0726
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

*****DESIGN COMPETITION WINNERS ANNOUNCED.** A student team from three Kansas universities -- the University of Kansas, Kansas State and Wichita State -- introduced an operator-friendly aircraft design earning them first place in the first annual NASA/FAA National General Aviation Design Competition. Embry-Riddle Aeronautical University, Daytona, Fla., took second; Mississippi State University took third; and a design group representing the University of Virginia, the Pratt Institute at Brooklyn and Mallen Research Corp. of Charlottesville took an honorable mention.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

- more -

REMINDER: 'SEAFOOD FARMING' TALK AUG. 1. Michael J. Oesterling, an aquaculture specialist, will speak Aug. 1 at NASA Langley on "Virginia Marine Aquaculture: Research and Product Development." He will trace the development of Virginia's marine aquaculture industry and methods of production. Media are invited to the 2 p.m. talk and to a media briefing at 1:15 p.m. at the H.J.E. Reid Conference Center. Will be repeated at Virginia Air & Space Center, Hampton, at 7:30 p.m.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122/3

AERONAUTICS IN THE 21ST CENTURY. James A. Blackwell, the president of the Aeronautics Sector of Lockheed Martin, will share his views of the future of aeronautics with NASA Langley employees at 2 p.m., August 15 in the H.J.E. Reid Conference Center. A media briefing will be held in the Wythe Room at 1:15. Blackwell will discuss the effects of international competition on the aerospace industry and the importance of a strong partnership between government and industry to maintain U.S. technological leadership. Interviews available.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122

MICROGRAVITY EFFECTS ON SPACE STRUCTURES. The Joint Dynamics Experiment (JDX), a cooperative effort between NASA Langley and Utah State University, will be flown aboard Endeavour (STS-69) in early August. The experiment is designed to study how well joints on space structures dissipate vibrations. The data is important for building the International Space Station. Interviews, photos available.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122

STUDYING THE EFFECTS OF BIOMASS BURNING. Scientists from NASA Langley will spend six weeks in central Brazil studying the atmospheric effects of biomass burning. The field experiment, which begins Aug. 16, will involve coordinated aircraft, surface and satellite measurements of smoke characteristics and the interaction of the smoke with clouds. More than 80 researchers from four NASA centers, two U.S. agencies, five U.S. universities, 12 Brazilian agencies and six Brazilian universities will participate. The experiment, called SCAR-B (Smoke, Clouds, and Radiation - Brazil), is managed by NASA Langley. Interviews, photos available.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122

RESOURCE PHOTOGRAPHS:

REUSABLE LAUNCH VEHICLES. Color 8 x10 photos are available of two reusable launch vehicle (RLV) models being tested in the 31-Inch Mach 10 Hypersonic Wind Tunnel at NASA Langley. The RLV program calls for development of one or more launch vehicles that could deliver payloads and people to space, fly back to Earth, and be used again. Marshall Space Flight Center in Huntsville, Ala., is host center for the industry-led RLV effort.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

LOOKING AHEAD:

NASA LANGLEY GOES TO THE FAIR. Look for NASA Langley's exhibit at the Virginia State Fair, Richmond, from Sept. 21 to Oct. 1.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6124

- End -

NASA News

National Aeronautics and
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For release: August 2, 1995

Keith Henry
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RELEASE NO. 95-74

BOEING SELECTED TO NEGOTIATE FOR AERONAUTICS CONTRACT

NASA's Langley Research Center, Hampton, Va., has selected Boeing Commercial Airplane Group, Seattle, Wash., for negotiation of a $24 million contract in support of the Advanced Composites Technology program.

Under the contract, Boeing will design, analyze, fabricate and verify large composite fuselage structures for a commercial transport aircraft. The work is to be conducted at Boeing's Seattle plant from 1995 to 2000.

The major goals of the contract are to verify innovative new fuselage technology through design, fabrication and testing of structural elements, sub-components and full-scale side panel components.

NASA has been developing composite primary fuselage structures under the Advanced Composites Technology program which began in 1989. The Boeing contract results are expected to provide the initial technical data for the potential application of composite fuselage structures in 21st century commercial transport aircraft.

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NASA News

National Aeronautics and
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For release: Aug. 28, 1995

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RELEASE NO. 95-75

MULTI-PURPOSE THERMOPLASTIC RECEIVES R&D 100 AWARD

A NASA Langley researcher's multi-purpose thermoplastic material received an R&D 100 award for one of the 100 most significant new technical products of 1994.

Dr. Robert G. Bryant, a chemical engineer, developed the self-bonding thermoplastic called LaRC™-SI. Three electronic technicians, who helped to develop various applications of the thermoplastic, share in the award. The technicians are Robert L. Fox, Nancy Kruse and Sang Tran, all from NASA Langley.

The R&D 100 award (formerly IR-100) is presented annually by *Research and Development* magazine to the innovators of the 100 most technologically significant new products of the year. Selections are made by a panel of scientists and engineers after studying new technology around the world.

LaRC™-SI (soluble imide) is an amorphous thermoplastic, meaning it can be reformed at elevated temperatures and pressure. It is also recyclable. The material has an exceptional combination of properties resulting in a wealth of applications. It can be applied in the form of spray, spin and dip coating.

Potential applications for the thermoplastic include a resin for mechanical parts such as gears, bearings and valves; advanced composites like carbon fiber, and high strength adhesives. It can also be used to make film and self-bonding multilayer flex circuits.

LaRC™-SI's properties make it a leader among similar materials on the commercial market. Companies, universities and government labs are studying it to determine further applications.

In the 26 years of NASA's participation in the R&D 100 competition, 101 NASA developments have been selected, contributing significantly to the recognition of

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NASA as a source of technical excellence. Langley has earned 29 of NASA's 101 awards.

This year's R&D 100 winners will be honored at an awards banquet at the Museum of Science and Industry in Chicago on Sept. 21. An exhibit of the award-winning products will be on display at the museum from Sept. 18 through Oct. 15.

-End-

NOTE: A photograph is available to illustrate this release.

NASA News

National Aeronautics and
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For Release: August 11, 1995

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RELEASE NO. 95-79

NASA LANGLEY 30- by 60-FOOT TUNNEL TO BE CLOSED

NASA's oldest operating wind tunnel, the 30- by 60-Foot Tunnel, will be closed Sept. 29. The historic facility, originally known as the Full-Scale Tunnel (FST), is located at NASA Langley Research Center in Hampton, Va.

The closing of the 30- by 60-Foot Tunnel allows for an orderly consolidation of aeronautical testing facilities as a time of shrinking federal budgets and enables essential center capabilities to be preserved.

The 30- by 60-Foot Tunnel is a subsonic wind tunnel originally designed for the testing of full-scale models and actual airplanes at operational flight speeds. Such ground-based testing eliminated scale effect and provided basic information prior to and during flight testing. Contemporary studies in the tunnel often focuses on stability and control characteristics and high-lift capability for both civil and military aircraft.

Throughout its history, the 30- by 60-Foot Tunnel has been used for the testing of innumerable vehicle configurations. It was the largest wind tunnel in the world until 1945, and in 1985 it was named a National Historic Landmark.

The 30- by 60-Foot Tunnel has contributed to military, commercial and general aviation aircraft designs. Its many contributions include fundamental aerodynamic testing of full-scale aircraft during the 1930s; drag reduction or "clean up" studies of full-scale aircraft during World War II; free-flight testing of models of vertical takeoff and landing aircraft; testing of the Albacore, the fastest submarine in the world in 1950; testing the nation's first spacecraft, the Mercury space capsule; testing of full-scale general aviation aircraft; and testing of lifting body, supersonic transport and present-day military aircraft configurations.

Designs for the tunnel were begun in 1929, with $900,000 of funding appropriated before the Depression. Because the tunnel was designed and built during the Depression, the design team, led by Smith J. DeFrance, was able to take advantage of cheap materials and a large pool of unemployed engineers. Construction began in the spring of 1930 and the completed 30- by 60-Foot Tunnel was dedicated on May 27, 1931.

The overall tunnel is 434 feet long and 222 feet wide with a maximum height of

-more-

97 feet. The actual test section is an open-jet 30 feet high, 60 feet wide and 56 feet long. Two four-bladed wooden propellers, each 35.5 feet in diameter and powered by a 4,000-horsepower motor, generate the air stream. The tunnel is a closed-loop design, with two return passages that allow air flow at speeds up to 120 mph.

Over the years the test section of the tunnel has been modified several times to adapt to changing needs. During renovations in the 1960s and 1970s, the tunnel was equipped for free-flight dynamic model testing. In recent years, the tunnel has been extensively used for such free-flight tests. This test technique, unique to this facility involves flying 10- to 20-percent scaled models controlled by remotely-positioned pilots.

The future of the 30- by 60-Foot Tunnel is uncertain, but there are no plans to tear it down or to change its external appearance. Possible adaptive uses are under study and certain components may be made available to the National Air and Space Museum (Smithsonian) or other museums. NASA Langley is a federal custodian of historic properties in conformance with the provisions of the National Historic Preservation Act.

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NASA News

National Aeronautics and
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Release No. 95-080 For Release: Immediately

NASA Langley Story Opportunities- September

ROBO-CLEANUP. A heavy duty robot arm is being developed at Langley for the federal Department of Energy for use in the cleanup of hazardous materials, such as radioactive contamination, at sites around the country. The robot arm is being built and is due to be demonstrated in September at Langley. When completed, the robot arm will be operated remotely, with cameras sending visual images back to the operator.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

STUDYING EFFECTS OF SMOKE ON ATMOSPHERE. Scientists from NASA Langley are spending six weeks in central Brazil studying the atmospheric effects of biomass burning. The field experiment began Aug. 16 and involves coordinated aircraft, surface, and satellite measurements of smoke characteristics and the interaction of the smoke with clouds. More than 80 researchers from 4 NASA centers, 2 U.S. agencies, 5 U.S. universities, 12 Brazilian agencies and 6 Brazilian universities will participate. Phone interviews, photos and B-roll video are available.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122

THERMOPLASTIC NAMED 1 OF 100 BEST. *Research and Development Magazine* have recognized a Langley researcher and his team for the creation of a multi-purpose thermoplastic material. This innovation was judged one of the 100 most significant new technical products of 1994. Possible applications for this product include a resin for mechanical parts such as gears, bearing and valves; and advanced composites like carbon fiber and high strength adhesives. The winners will be honored at an awards ceremony to be held at the Museum of Science and Industry in Chicago on Sept. 21.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

FLIGHT TESTING BEGINS FOR NOVEL CONCEPT. Flight testing has begun on a NASA Langley device that promises to give fighter pilots of the future increased agility in air combat. The tests, being conducted at NASA Dryden from August through December, are the culmination of a several year effort. The device is a deployable wing-like surface installed on the nose of a modified F-18 research aircraft. When deployed in wind tunnel tests, the surfaces improved the aerodynamic flowfield about the aircraft forebody. The device is called ANSER, short for Actuated Nose Strakes for Enhancement Rolling.
DRYDEN PUBLIC AFFAIRS CONTACT: John Childress (805) 258-2664
LANGLEY PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

- more -

NASA REL- 95-080/2

SPACE-AGE STUDENTS DESIGN SHUTTLE EXPERIMENT. The Joint Dynamics Experiment (JDX), a cooperative effort between NASA Langley and Utah State University, will be flown aboard Endeavour (STS-69) in September. The experiment is designed to study how well the joints on structures in space are able to dissipate vibrations. This data is important to engineers building the International Space Station. Interviews and photos available.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122

HISTORIC TUNNEL TO BE CLOSED. NASA's oldest operating wind tunnel, will be closed Sept. 29. This historic facility, originally known as the Full-Scale Tunnel, has served in many capacities- military, commercial and general aviation. Throughout its history the 30- by 60-Foot Tunnel has been used for innumerable vehicle configurations, such as WWII aircraft and the first space capsule.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

AIRBORNE TESTS FOR NEW WATER VAPOR INSTRUMENT. A comprehensive validation of the Lidar Atmospheric Sensing Experiment (LASE) laser system is planned for September at the NASA Wallops Flight Facility. Validation measurements include three laser systems (two aircraft- and one ground-based) and instrumented balloons. Upon completion of the validation experiment, the LASE system will be used for atmospheric investigations involving water vapor, aerosols and clouds, and for developing and testing advanced laser technology and techniques needed for future spaceborne laser water vapor investigations. Interviews and photos available.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122

NASA LANGLEY GOES TO VIRGINIA STATE FAIR. NASA Langley will participate in the Virginia State Fair, from Sept. 21 to Oct. 1, in Richmond. Langley will be presenting a series of interactive exhibits to foster interaction between volunteers and visitors, and to inform the public of the programs at Langley. The theme for the Commonwealth Technology building, the primary NASA exhibit hall, is the Information Superhighway. Exhibits vary dramatically in topics from electronics, wind tunnels and noise reduction technology to research and information available over the World Wide Web.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

SURFING THE NET: LANGLEY HOSTS INTERNET FAIR II. NASA Langley will host Internet Fair II in the Reid Conference Center from 9 a.m. to 4:30 p.m. Oct. 23-24. The mission of Internet Fair II is to exchange NASA and Hampton Roads information technology while emphasizing challenges and solution for the future. The fair, which is open to the public, will include exhibits from NASA Langley, local businesses and universities. Exhibits will demonstrate available tools and products applicable to social and business needs as well as highlight the cost benefits of information technology.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

REMOVING DANGEROUS CARBON MONOXIDE. Someday soon a device that removes carbon monoxide – the cause of many deaths every winter – may be in homes across the nation. Researchers at NASA Langley have developed a catalyst that changes carbon monoxide into less-harmful carbon dioxide. The catalyst originally was developed for use in space-based lasers. But researchers discovered its earthly applications, and since then have signed agreements with several companies that plan to use the product.
PUBLIC AFFAIRS CONTACT: Michael Finneran (804) 864-8150.

- end -

NASA News

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For Release: August 25, 1995

RELEASE No. 95-85

AIRPORT AUTOMATION CONCEPTS TESTED

NASA Langley Research Center has completed a flight demonstration of airport automation concepts that promise to safely increase traffic capacity on airport runways and taxi surfaces at our nation's airports. As envisioned, the concepts will provide flight crews with the status of ground traffic at a typical airport along with air traffic control instructions. They will also provide ground controllers with a clear picture of airport surfaces traffic both day and night and in all weather conditions.

Information gathered during this demonstration showed that the most advanced communications, navigation and surveillance technologies can provide significant improvements in aircraft ground operations. These tests also showed that virtually instantaneous data communications can be maintained among several systems while maintaining aircraft surveillance within three meters on the airport surface.

Because aircraft movement on the airport surface is not without risk, these flight demonstrations show advantages for airports that use these technologies. Enhanced efficiency and safety can be achieved with automation by reducing human error and minimizing pilot and controller workload.

The tests were conducted using the NASA Boeing-737 at the FAA Tech Center located at the Atlantic City International Airport. They are part of NASA's Terminal Area Productivity (TAP) program, a seven-year program begun in 1994 with the goal of increasing airport capacity and reducing passenger delays.

During these tests, an air traffic controller with a data link between the control tower and the aircraft sent approved taxi routes and hold instructions to the aircraft. The information from the controller was displayed on a NASA Langley developed electronic moving map onboard the aircraft. Positions of airport traffic obtained from a ground surveillance radar were also sent to the aircraft for display on the map.

The B-737 was instrumented with onboard data and video equipment and a video telemetry link. The telemetry link allowed ground based officials to see the

-more-

aircraft movements on the taxiways and cockpit activities, including the electronic moving map, as they occurred.

Westinghouse Norden Systems, headquartered in Norwalk, Conn., provided the Airport Surface Detection Equipment (ASDE-3) radar and the Airport Movement Area Safely System (AMASS). ASDE is a high resolution ground mapping radar that provides airport traffic controllers with all weather surveillance capabilities. AMASS provides safety advisories for ground controllers with automatic audio and visual alerts. The ARINC company, based in Annapolis, Maryland, provided the high speed data link and a ground-based communications workstation.

-end-

NASA News

National Aeronautics and
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For release: Sept. 12, 1995

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RELEASE NO. 95-089

NOTE TO EDITORS:
Closing Ceremony for NASA Langley's 30- by 60-Foot Tunnel

A ceremony will be held Oct. 27 at NASA Langley Research Center to mark the closing of the 30- by 60-Foot Tunnel and to commemorate the contributions of this remarkable 64-year research facility. The cavernous wind tunnel is scheduled for closing at the end of September. It is NASA's oldest operating wind tunnel.

Originally known as the Full Scale Tunnel, it has been operational since its dedication in 1931. It was the largest wind tunnel in the world until 1945 and in 1985 was named a National Historic Landmark.

The tunnel's many contributions include fundamental aerodynamic testing of full-scale aircraft during the 1930s; drag reduction or "clean up" studies of full-scale military aircraft during World War II; free-flight testing of models of vertical takeoff and landing aircraft; testing of the Albacore, the fastest submarine in the world in 1950; testing of the nation's first spacecraft, the Mercury space capsule; testing of full-scale general aviation aircraft; and testing of lifting body, supersonic transport and present-day military aircraft configurations.

The ceremony will formally mark the closing of the facility. Joseph Chambers, chief of the Aeronautics Research Analysis Division and former head of the 30- by 60-Foot Tunnel, will speak on the history and accomplishments of the tunnel. Dr. Harry Butowsky, historian for the National Park Service, will address the contributions of the facility to the aerospace community. Other program details are to be announced. The ceremony will conclude with a "wine and cheese" social.

The ceremony will be held at 3 p.m. in the return air duct of the 30- by 60-Foot Tunnel, Bldg. 643, 244 Hunting Ave, NASA Langley East Area.

- end -

NOTE: Photos are available upon request by calling 804-864-6120.

NASA News

National Aeronautics and
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For release: Oct. 20, 1995

RELEASE NO. 95-95

NASA TESTS ADVANCED RADIAL TIRES FOR LARGE AIRLINERS

NASA is working with the Michelin Aircraft Tire Corp., Charlotte, N.C., to document the durability of advanced radial tires designed for use on new jumbo jets and the envisioned supersonic high-speed civil transport.

Radial tires have proven to be lightweight, produce less drag and generate less heat than conventional bias tires in 5 years of smaller aircraft use in this country and 10 years of use in European countries.

The successful tests are expected to speed up the process of certification by the FAA, according to NASA project engineer Bob Daugherty. "The fuel costs and savings produced are just phenomenal," he said. The tires are the largest in commercial use and similar to the main gear tires being considered by Boeing for its new wide-bodied transport, the "777."

The tests, just concluded, were performed at NASA Langley Research Center, Hampton, Va., using the center's unique aircraft landing dynamics facility. Langley is recognized for its highly successful space shuttle orbiter tire durability research.

The Langley-Michelin partnership is being supported by a Space Act Agreement. "This is a perfect example of a U.S. industry, the aircraft tire industry, benefiting from NASA invested capital and helping keep our country ahead of the competition," said Daugherty.

The advanced radial tire tests were designed to define the mechanical properties of the tires at various loads. Slow speed tests were performed using a carriage testbed equipped with a test tire.

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In addition, tire relaxation lengths and side forces were measured on a "frictionless" test platform positioned at the end of a simulated steel runway in the carriage hangar. The test platform rotates and can be pulled sideways, pulling the test tire with it. The specially designed equipment is capable of pulling up to 80,000 pounds of side load.

"This was a big challenge. It took about 6 months to come up with the side loading system, but it worked extremely well," said Daugherty.

Follow-on tests next spring, unrelated to the Michelin agreement, may make use of the Langley facility's outdoor test track where aircraft landings can be simulated at actual landing speeds using a railed carriage that drops the test tire onto a simulated runway.

Meanwhile, Michelin and Langley are exploring the possibllity of further joint work on advanced radial tires.

- end -

NASA News

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October 11, 1995

Langley Rel. 95-099 (Also Headquarters Rel. 95-175)

NASA FLIGHT TESTING BEGINS FOR F-18 NOSE STRAKES

NASA is flight testing a new aircraft control device that promises to give fighter pilots of the future increased maneuverability and agility in air combat situations.

Two moveable "flipper-like" panels called strakes have been installed on the nose of an F-18 aircraft at NASA's Dryden Flight Research Center, Edwards, Calif. When opened, the strakes (four feet long, six inches wide, and hinged along the bottom edge) interact with strong vortices of air generated by the nose of the aircraft. This interaction produces side forces which can give a pilot yaw (left or right) control of the aircraft's nose at high angles of attack when conventional rudders lose their effectiveness.

"Angle of attack" is a term used to describe the angle of an aircraft's body and wings in relation to its actual flight path. During maneuvers, pilots often fly at extreme angles of attack, with the nose pitched up while the aircraft continues in its original direction. This can lead to conditions in which the flow of air over the rudder is not enough for the pilot to maintain yaw control.

The strake project, called Actuated Nose Strakes for Enhanced Rolling (ANSER) is managed by the NASA Langley Research Center, Hampton, Va. The current flight project is validating extensive wind tunnel and simulation data by Langley and NASA's Ames Research Center, Moffett Field, Calif.

The strake testing is being carried out with the modified F-18 NASA has been using for high angle of attack studies at Dryden since the late 1980s.

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About 65 flights to study the strakes at various angles of attack and speeds are planned before the ANSER project is scheduled to conclude at the end of this year.

- end -

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Don Nolan-Proxmire
Headquarters, Washington, D.C.
(202) 358-1983

Don Haley
Dryden Flight Research Center, Edwards, Calif.
(805) 258-3456

Keith Henry
Langley Research Center, Hampton, Va.
(804) 864-6120

Date: Oct. 18, 1995

Rel. 95-100 (also Headquarters Rel. 95-184)

NASA FLIGHTS WILL TEST BREAKTHROUGH AIRPLANE CONCEPT

NASA has begun flight testing an experimental aircraft wing panel that may lead to a revolutionary way of improving the aerodynamics and fuel consumption on large future supersonic aircraft.

The goal of the project is to achieve what is called laminar, or smooth, air flow over the surface of an aircraft's wing while flying supersonic, or faster than sound. Researchers say that laminar flow conditions can reduce aerodynamic drag, or friction, and contribute to reduced operating costs by improving fuel consumption and lowering aircraft weight.

If the NASA project is successful, a method of maintaining laminar flow control could be incorporated into the design of the High Speed Civil Transport (HSCT), a conceptual supersonic airliner of the future that would carry 300 passengers at 2.4 times the speed of sound.

"This is a very important event in the history of aerodynamics. If we are successful, supersonic laminar flow control will revolutionize flight," said Jeffrey Lavell, project manager of the F-16XL Supersonic Laminar Flow Control (SLFC) flight experiment at NASA Langley Research Center in Hampton, Va. Langley manages the project, which is part of the agency's High-Speed Research Program dedicated to producing technologies critical to the development of a supersonic passenger jet.

Flights with the SLFC experiment are being carried out at NASA Dryden Flight Research Center in Edwards, Calif., using an F-16XL, which has a large delta wing. The wing's shape is similar to the design that likely will be used on the HSCT, making the F-16XL an excellent testbed for the laminar flow research project.

- more -

A large panel, called a glove, has been attached to the upper surface of the test aircraft's left wing. The titanium panel has been perforated with more than 10 million laser-cut holes, while below the panel is a suction system linked to a compressor.

Natural aerodynamic drag on an aircraft wing is caused by the friction of a thin turbulent layer of air moving across the wing's surface. During coming research flights with the modified F-16XL, the suction system will pull a portion of that thin layer of air through the glove's porous surface to keep the airflow from becoming turbulent.

The area below the glove has been divided into 20 sections, and the strength of the suction in each compartment can be controlled individually to attain specified conditions during the research flights.

The manager of the SLFC project at Dryden, Marta Bohn-Meyer, said that up to 70 flights are planned, with as many as 30 to be flown before the end of 1995. Most of the research flights will be at speeds of Mach 2 (1,400 mph) and altitudes of 35,000 to 50,000 feet, the proposed range for the HSCT.

NASA project officials hope to have enough data by December to give HSCT designers an update on the feasibility of the use of SLFC when they meet then to study possible technologies to incorporate into that aircraft.

The SLFC experiment represents a collaborative effort between NASA and the aerospace industry. A team composed of Boeing, Rockwell and McDonnell Douglas designed the wing panel and suction system. The panel was assembled at a Boeing facility in Seattle, Wash., while the suction system was fabricated by McDonnell Douglas in Long Beach, Calif.

NOTE TO EDITORS: Color artist concepts of the HSCT are available by calling the Langley Research Center at (804) 864-6124. Photos of the F16XL aircraft are available by calling the Dryden Flight Research Center at (805) 258-3449.

- end -

NASA press releases and other information are available automatically by sending an Internet electronic mail message to domo@hq.nasa.gov. In the body of the message (not the subject line) users should type the words "subscribe press-release" (no quotes). The system will reply with a confirmation via E-mail of each subscription. A second automatic message will include additional information on the service. Questions should be directed to (202) 358-4043.

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Don Nolan-Proxmire
Headquarters, Washington, D.C.
(Phone: 202-358-1983)

For release: Oct. 27, 1995

Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804- 864-6120)

RELEASE NO. 95-101 (Also Headquarters Rel. 95-194)

HISTORIC NASA WIND TUNNEL IS RETIRED

NASA's oldest operating wind tunnel, which has tested everything from biplanes to a Mercury space capsule to far-out airplanes of the future, is being retired.

The unique facility had been modified several times over its 64 years to keep up with the growing size of aircraft and with improvements in test techniques. But this time, it's shutting down, and its work will be done in other NASA wind tunnels.

The cavernous wind tunnel was completed in 1931 to test the aerodynamic characteristics of full-scale models and actual airplanes at operational flight speeds. It was originally called the "Full Scale Tunnel." Located at NASA Langley Research Center, Hampton, Va., it was declared a National Historic Landmark in 1985.

Full scale testing eliminated the uncertainties of model testing and provided basic information prior to and during flight testing. Contemporary studies in the renamed 30- by 60-Foot Tunnel often focused on stability and control characteristics for military aircraft, and high-lift capability for both civil and military aircraft.

Throughout its history, the 30- by 60-Foot Tunnel has been used for the testing of innumerable aircraft configurations. It was the largest wind tunnel in the world until 1945.

The 30- by 60-Foot Tunnel has contributed to military, commercial and general aviation aircraft designs. Its many contributions include fundamental aerodynamic testing of full-scale aircraft during the 1930s; drag reduction or "clean up" studies of full-scale military aircraft during World War II; free-flight testing of models of vertical takeoff and landing aircraft; testing of the Albacore, the fastest submarine in the world

- more -

in 1950; testing of the nation's first spacecraft, the Mercury space capsule; testing of full-scale general aviation aircraft; and testing of lifting body, supersonic transport and present-day military aircraft configurations. Designs for the tunnel were begun in 1929, with $900,000 of funding appropriated before the Depression. Because the tunnel was designed and built during the Depression, the design team, led by Smith J. DeFrance, was able to take advantage of cheap materials and a large pool of unemployed engineers. Construction began in the spring of 1930 and the completed 30- by 60-Foot Tunnel was dedicated on May 27, 1931.

The overall tunnel is 434 feet long and 222 feet wide with a maximum height of 97 feet. The actual test section is an open-jet 30 feet high, 60 feet wide and 56 feet long. Two four-bladed wooden propellers, each 35.5 feet in diameter and powered by a 4,000-horsepower motor, generate the air stream. The tunnel is a closed-loop design, with two return passages that allow for continuous air flow at speeds up to 120 mph.

Over the years the test section of the tunnel has been modified several times to adapt to changing needs. During renovations in the 1960s and 1970s, the tunnel was equipped for free-flight dynamic model testing. In recent years, the tunnel was extensively used for such free-flight tests. This test technique, unique to this facility, involved flying 10- to 20-percent scaled models controlled by remotely-positioned pilots.

The future of the 30- by 60-Foot Tunnel is uncertain, but there are no plans to tear it down or to change its external appearance. Possible adaptive uses are under study and certain components may be made available to the National Air and Space Museum (Smithsonian) or other museums. NASA Langley is a federal custodian of historic properties, in conformance with the provisions of the National Historic Preservation Act.

- end -

NOTE: A video clip and the following photographs are available to illustrate this release.

(LMAL 30652)	F4U-1 Airplane Tested in the 30- by 60-Foot Tunnel
(L 59-336	Mercury Capsule in the 30- by 60-Foot Tunnel
(NACA 5553)	Vought Corsair Airplane Test in the 30- by 60-Foot Tunnel
(L 87-08104)	Free Flight Testing F-18 in the 30- by 60-Foot Tunnel
(L 95-04049)	Waverider LoFlyte Model in NASA Langley's 30- by 60-Foot Tunnel
(NACA 4655)	Construction of the 30- by 60-Foot Tunnel
(L 89-07075)	Aerial View of the 30- by 60-Foot Tunnel
(L 75-00734)	Supersonic Model in NASA Langley's 30- by 60-Foot Tunnel
(L 81-07333)	VariEze Full Scale Model Tested in the 30- by 60-Foot Tunnel
(L 90-09207)	Free Flight Testing in the 30- by 60-Foot Tunnel
Graphic	The 30- by 60-Foot Tunnel Plan View

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Release No. 95-107 For Release: Immediately

NASA Langley Story Opportunities- November

STUDYING THE EFFECTS OF MICROGRAVITY ON SOLAR ARRAYS. The Photogrammetric Appendage Structural Dynamics Experiment (PASDE) will be flown aboard the Space Shuttle Atlantis (STS-74) in November. PASDE is designed to use photography to determine how much solar arrays move aboard the Russian space station Mir. Movements in the solar arrays will be videotaped during the docking of Atlantis with Mir, the transition from sunlight to darkness, and during a variety of on-orbit maneuvers. This on-orbit data is important to engineers building the International Space Station. Interviews, photos, b-roll video and graphics available. For more information on the PASDE project, please visit the PASDE WWW site at **http://pasde.larc.nasa.gov/pasde/PASDE.html**.
CONTACT: Catherine E. Watson (804) 864-6122 or (713) 483-5111 (during mission).

CLOUD REMOTE SENSING INSTRUMENT DELIVERED. TRW Inc. delivered the first of six Clouds and the Earth's Radiant Energy System (CERES) instruments to Goddard Space Flight Center in late October for integration aboard the Tropical Rainfall Measuring Mission (TRMM) spacecraft. The Langley-managed CERES instrument is the follow-on to the ERBE instrument, which has been returning unprecedented data about the Earth radiation's budget since October 1984. CERES/TRMM is scheduled for launch in August 1997. Interviews and photos are available. For more information on the CERES project, visit the CERES WWW site at:
http://asd-www.larc.nasa.gov/ceres/ASDcereshome.html.
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122

PAVERS: THE LANDING STRIPS OF THE FUTURE. Langley's Aircraft Landing Dynamics Facility (ADLF) is evaluating new surfaces for aircraft landing strips. These findings may eventually contribute to improving aircraft safety during ground operations under adverse weather conditions. Four concrete paver block designs have been introduced to study aircraft tire friction performance; other designs will also be incorporated into the testing process.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

- more -

NASA LANGLEY ON THE WORLD WIDE WEB. *For more information on the wide variety of ongoing NASA Langley research projects please check out our home page on the World Wide Web. The URL address for the NASA Langley home page is:* ***http://www.larc.nasa.gov/larc.html***
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122.

SMALL BUSINESSES TO STIMULATE GENERAL AVIATION. NASA has announced the selection of 16 small businesses for negotiation of general aviation-related contracts in the Agency's 1995 Small Business Innovation Research (SBIR) Program. Nine companies were selected for contracts worth up to $70,000 to perform six-month Phase I feasibility studies. Seven more companies, having successfully completed Phase I studies, were selected for contracts up to $600,000 for two-year research projects. Projects range from simplified cockpit controls and displays to detection of storm hazards to breakthroughs in structures and materials. Call for company listing.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

HAMPTON, THE EAGLE HAS LANDED: On Nov. 14, retired NASA research pilot Lee Person Jr. will discuss the space simulators developed at NASA Langley in the 1960s to prepare astronauts for maneuvering in space and on the moon. These simulators include the Langley Lunar Landing Research Facility, used to simulate the lunar lander's last 150-foot descent to the surface of the moon. "Earthbound 'Flying' Simulators for Weightless Rendezvous and Lunar Landings" will be presented Tuesday, Nov. 14, at 2 p.m. in the H.J.E. Reid Conference Center, 14 Langley Blvd., Hampton Va. Interviews and photos are available.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

ADVANCED RADIAL TIRES TESTED. Tests at NASA Langley are expected to speed the process of government certification of advanced radial tires for jumbo jets. Boeing is considering radial tires for its new wide-bodied 777. Radial tires, a staple on automobiles for years, have proven to be lightweight, produce less drag and generate less heat than conventional bias tires in five years of use on smaller aircraft in this country. The tests were conducted with Michelin Aircraft Tire Corp., Charlotte, N.C. The partnership is supported by a Space Act Agreement.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

NEW TITLE AND FOCUS FOR SPACEMOBILE. Aerospace Education Services Program (AESP) previously identified as the Spacemobile program, provides a premier NASA outreach program to teachers and students. The primary focus of the new AESP will be an increase in teacher enhancement at the precollege level. Making educators familiar with NASA activities will aid in the production of future scientists and engineers.
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120
AESP CONTACT: Gerri Polhamus (804) 864-3302

PULITZER PRIZE NOMINEE OUT OF THIS WORLD. Spaceflight Revolution, the most recent book by Dr. James R. Hansen, has been nominated for the Pulitzer Prize. Hansen, an expert on NASA Langley history, explores the Langley contribution to the race into space from "Sputnik to Apollo." To obtain a copy contact the Government Printing Office Order Desk. Selling price is $30.
GOVERNMENT PRINTING OFFICE ORDER DESK: (202) 512-1800
PUBLIC AFFAIRS CONTACT: Keith Henry (804) 864-6120

- END -

NASA LANGLEY ON THE WORLD WIDE WEB. *For more information on the wide variety of ongoing NASA Langley research projects please check out our home page on the World Wide Web. The URL address for the NASA Langley home page is:* ***http://www.larc.nasa.gov/larc.html***
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122.

NASA News

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-0001

Release No. 95-112 For Release: Dec. 4, 1995

NASA Langley Story Opportunities-December

REMINDER -- TALK TOMORROW: JOYS AND TRIALS OF 115 DAYS IN SPACE. America's longest-flying space traveler, astronaut Norman Thagard, will be the guest speaker at 2 p.m. Dec. 5 at the NASA Langley H.J.E. Reid Conference Center, Hampton, Va. Thagard will relate his more than 100-day experience as an inhabitant of the Russian space station Mir. A veteran of five space flights, Thagard has logged a U.S. record of 104 days in space. Interviews and photos are available.
CONTACT: Catherine E. Watson (804) 864-6122

'WORKING TOGETHER' WORKS. Jim McWha, Chief Engineer of Flight Systems for the Boeing Company, will discuss the development of the Boeing 777. The new airplane set a new standard for cooperation between Boeing and the airlines and suppliers, as well as between the engineering and operations groups within Boeing. The colloquium will take place at 2 p.m. Dec. 12 at the H.J.E. Reid Conference Center, Hampton, Va.
CONTACT: Catherine E. Watson (804) 864-6122

ELECTRONIC LISTING IS PROTOTYPE FOR CHARITIES NATIONWIDE. NASA Langley and the Virginia Peninsula Combined Federal Campaign have teamed up to put the CFC health and human welfare agency listing brochure on the world wide web. Hailed as "revolutionary" by Jack Garber, the national CFC director, the move promises to save printing costs and make more money available to those who really need it. The brochure is the single most expensive element of CFC campaigns across the nation. Other CFC communities are expected to adopt the Peninsula initiative as a model. World-wide web address for the listing is http://agate.larc.nasa.gov/cfc/cfc.html.
CONTACT: Keith Henry (804) 864-6120

- more -

NASA LANGLEY ON THE WORLD WIDE WEB. For more information on the wide variety of ongoing NASA Langley research projects please see our home page on the World Wide Web. The URL address for the NASA Langley home page is: ***http://www.larc.nasa.gov/larc.html***
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122.

NASA HELPS STUDENTS REACH FOR THE STARS. Students at Phoebus High School, Hampton, Va. are building a one-story high model rocket with the help of engineers from the NASA Langley Research Center. The students plan to launch the rocket from the NASA Wallops Island Flight Facility, Va. in mid-December. The Phoebus rocket will carry two instruments that will make measurements of the atmosphere as the rocket parachutes to earth after ascending to 2,000 feet.
CONTACT: Catherine E. Watson (804) 864-6122

ECONOMIC IMPACT OUTLINED IN NEW BOOK. A comprehensive summary of NASA Langley's institutional and finanical impact on the nation and the state of Virginia is available free upon request. The book covers a variety of topics including the center's workforce, program accomplishments and partnerships, community service, facilities, awards to businesses and educational institutions, financial data and education programs. It will be available on the World Wide Web by spring. In the meantime, requestors may leave their mailing address at the number below.
CONTACT: Public Mail Center (804) 864-3293

News Media Only:

FOR EMERGENCY INFORMATION, DIAL .... Whether it be a federal shutdown, bad weather or some unforeseen emergency, dial our special telephone announcment system for the latest information on how the emergency is affecting NASA Langley. The announcement system is updated periodically for NASA Langley employees, but is also an excellent way for news media to keep informed during off-hours or peak activity.
NASA LANGLEY SPECIAL ANNOUNCEMENT SYSTEM: (804) 864-2111

- END -

NASA LANGLEY ON THE WORLD WIDE WEB. For more information on the wide variety of ongoing NASA Langley research projects please see our home page on the World Wide Web. The URL address for the NASA Langley home page is: ***http://www.larc.nasa.gov/larc.html***
PUBLIC AFFAIRS CONTACT: Catherine E. Watson (804) 864-6122.

News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

October 27, 1995

Don Nolan-Proxmire
Headquarters, Washington, DC
(Phone: 202/358-1983)

Keith Henry
Langley Research Center, Hampton, VA
(Phone: 804/864-6120)

RELEASE: 95-194

HISTORIC NASA WIND TUNNEL IS RETIRED

NASA's oldest operating wind tunnel, which has tested everything from biplanes to a Mercury space capsule to far-out airplanes of the future, is being retired.

Located at NASA Langley Research Center, Hampton, VA, it was declared a National Historic Landmark in 1985. The unique facility had been modified several times over its 64 years to keep up with the growing size of aircraft and with improvements in test techniques. Its work will be done in other NASA wind tunnels.

The cavernous wind tunnel was completed in 1931 to test the aerodynamic characteristics of full-scale models and actual airplanes at operational flight speeds. It was originally called the "Full Scale Tunnel."

Full scale testing eliminated the uncertainties of model testing and provided basic information prior to and during flight testing. Contemporary studies in the renamed 30- by 60-Foot Tunnel often focused on stability and control characteristics for military aircraft, and high-lift capability for both civil and military aircraft.

Throughout its history, the tunnel has been used for the testing of innumerable aircraft configurations. It was the largest wind tunnel in the world until 1945.

The tunnel has contributed to military, commercial and general aviation aircraft designs. Its many contributions include fundamental aerodynamic testing of full-scale aircraft during the 1930s; drag reduction or "clean up" studies of full-scale military aircraft during World War II; free-flight testing of models of vertical takeoff and landing aircraft; testing of the Albacore, the fastest submarine in the world in 1950; testing of the nation's first spacecraft, the Mercury space capsule; testing of full-scale general aviation aircraft; and testing of lifting body, supersonic transport and present-day military aircraft configurations.

-more-

Designs for the tunnel were begun in 1929, with $900,000 of funding appropriated before the Depression. Because the Tunnel was designed and built during the Depression, the design team, led by Smith J. DeFrance, was able to take advantage of inexpensive materials and a large pool of unemployed engineers. Construction began in the spring of 1930 and the completed 30- by 60-Foot Tunnel was dedicated on May 27, 1931.

The overall tunnel is 434 feet long and 222 feet wide with a maximum height of 97 feet. The actual test section is an open-jet 30 feet high, 60 feet wide and 56 feet long. Two four-bladed wooden propellers, each 35.5 feet in diameter and powered by a 4,000-horsepower motor, generate the air stream. The tunnel is a closed-loop design, with two return passages that allow for continuous air flow at speeds up to 120 mph.

Over the years the test section of the tunnel has been modified several times to adapt to changing needs. During renovations in the 1960s and 1970s, the tunnel was equipped for free-flight dynamic model testing. In recent years, the tunnel was extensively used for such free-flight tests. This test technique, unique to this facility, involved flying 10- to 20-percent scaled models controlled by remotely-positioned pilots.

The future of the Tunnel is uncertain, but there are no plans to tear it down or to change its external appearance. Possible adaptive uses are under study and certain components may be made available to the National Air and Space Museum or other museums. Langley is a federal custodian of historic properties, in conformance with the provisions of the National Historic Preservation Act.

-end-

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NASA News

National Aeronautics and
Space Administration

Langley Research Center
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Don Nolan-Proxmire
Headquarters, Washington, D.C.
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Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804- 864-6120)

For release: Feb. 13, 1996

Release No. 96-005

PILOTS TEST 'SYNTHETIC VISION' WITH WINDOWLESS LANDINGS

NASA has flight tested a "synthetic vision" concept that promises to help make supersonic flight practical and affordable for the average air traveler close to the turn of the century. The tests, in which pilots conducted windowless landings, were flown on a NASA 737 research aircraft over a three-month period ending in January.

Sensors tested included a digital video camera, three infrared cameras, and two microwave radar systems. The video and infrared images were combined with computer-generated graphics that gave the pilot cues during approaches and landings. One goal of the tests is to identify sensors that will replace or exceed the capabilities of human vision.

The same technology will provide all weather flying capabilities for high speed civil transport and future subsonic transports, allowing pilots to fly and land safely in low visibility conditions. This will increase the number of flights in poor weather, reduce terminal delays and cut costs for the airline industry and passengers.

Researchers are hoping that by enhancing the pilot's vision with high-resolution video displays, aircraft designers of the future can do away with the expensive, mechanically-drooping nose of early supersonic transports. Forward-looking windows would be eliminated, making way for large-format displays filled with high-resolution images and computer graphics.

As envisioned, such an aircraft would carry about 300 passengers at speeds up to Mach 2.4, (about 1,400 mph) over a 5,000 nautical mile range. Travel time across the Pacific Ocean would be cut in half, with only an approximate 20 percent fare increase over current subsonic prices.

- more -

The tests were flown on NASA's Transport Systems Research Vehicle (TSRV), a Boeing 737 equipped with a windowless research cockpit, and a Westinghouse BAC 1-11 avionics test aircraft. About 20 flights took place from NASA's Wallops Flight Facility at Wallops Island, Va., and Langley Air Force Base in Hampton, Va.

The flight tests consisted of two phases. During the sensor data collection phase, the TSRV and BAC 1-11 flew typical approach, cruise and holding patterns and tested the suitability of sensors to detect airborne traffic and ground objects. During the pilot-in-the-loop phase, the TSRV flew approaches and landings from the research cockpit and tested the pilot's ability to easily control and land the aircraft relying only on the sensor and computer-generated images and symbology.

The flight tests are part of the HSR Program's Flight Deck Systems research effort, a part of which aims to develop technologies allowing airframe companies to design, build and certify a cockpit without forward facing windows. Such a cockpit is important to a high-speed civil transport because it would avoid the need to incorporate a Concorde-like drooped nose design, which adds weight and mechanical complexity and increases fuel required for every flight.

The TSRV is a Boeing 737 aircraft that has been modified to incorporate a research flight deck in the passenger section. This research aircraft has been operated by NASA for more than 21 years and has conducted pioneering flight systems and aeronautics research ranging from electronic flight displays to first-of-its-kind satellite navigation and guidance, to proving the viability of airborne wind shear sensors.

The HSR Flight Deck research team includes NASA Langley Research Center, Hampton, Va.; NASA Ames Research Center, Mountain View, Calif.; The Boeing Company, Seattle, Wash.; McDonnell Douglas Corporation, Long Beach, Calif.; and Honeywell Incorporated, Phoenix, Ariz. Subcontractors supporting the flight tests included Rockwell Collins, Cedar Rapids, Iowa; FLIR Systems, Portland, Ore.; and Westinghouse Electric Corporation, Md.

- End -

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News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

July 2, 1996

Don Nolan-Proxmire
Headquarters, Washington, DC
(Phone: 202/358-1983)

Michael Finneran
Langley Research Center, Hampton, VA
(Phone: 804/864-6121)

RELEASE: 96-127

NASA LANGLEY DIRECTOR PAUL F. HOLLOWAY TO STEP DOWN

Paul F. Holloway has announced he is stepping down as director of NASA's Langley Research Center, Hampton, VA, no later than early October 1996.

Holloway said he is stepping down now to allow the appointment of a center director who could make a longer-term commitment to steering Langley through the challenges facing the Agency for the rest of the decade.

"This is the lull before the November election, and after that Langley is going to need the services of a center director who is willing to stick around for a while," said Holloway, a Langley employee since the beginning of his aerospace career in June 1960. "Everyone knows I have been considering leaving within the next two or three years, and this is a good time to do it."

"Paul Holloway will be missed," said NASA Administrator Daniel S. Goldin. "His career spans almost the entire history of the Space Age, and his many achievements at Langley are a tribute to his talent, his professionalism and his dedication to the importance of NASA aeronautical programs. We wish him all the best in the future."

Holloway said stepping down is not easy. "This has been my life for so many years, and I have made many friends. But I am confident that the wonderful people of Langley will carry on the reputation of this center as a world-class facility."

Holloway was named center director in October 1991 and is the sixth since Langley was founded in 1917 as the nation's first civilian aeronautical research laboratory. Langley has about 4,500 civil service and contractor employees and a $633.8-million fiscal 1996 budget.

-more-

REPRODUCED AT GOVT. EXPENSE

Holloway's technical expertise is in hypersonic aerodynamics, boundary layer transition and flow separation, analysis of entry flight mechanics and Earth orbital and planetary space missions. He has written 42 technical publications in his fields of expertise.

Holloway began his NASA career at Langley in June 1960 as an aerospace research engineer. He was appointed head of the Systems Analysis Section, Aero-Physics Division, in 1969; head of the Aerospace Operations Analysis Branch, Space Systems Division, in 1971; and chief of the Space Systems Division in 1972. In May 1975, Holloway became director for space.

In February 1985, he was named deputy director of Langley.

Holloway has earned numerous awards, including the NASA Outstanding Leadership Medal, the NASA Exceptional Service Medal, the NASA Distinguished Service Medal, the NASA Equal Employment Opportunity Medal, the Presidential Rank of Meritorious Service, and two Senior Executive Service Distinguished Presidential Rank Awards.

He is a Fellow of the American Institute of Aeronautics and Astronautics and the American Astronautical Society, and is a member of the International Academy of Astronautics.

Holloway graduated from Poquoson High School, Virginia in 1956 as salutatorian and has a bachelor of science degree and honors in aeronautical engineering from The Virginia Polytechnic Institute and State University and also attended the Advanced Management Program at Harvard Business School.

He and his wife, the former Barbara Menetch, live in Poquoson and have one son, Eric Scott, who lives in the same city.

- end -

REPRODUCED AT GOVT. EXPENSE

VideoAdvisory

National Aeronautics and
Space Administration

Washington, D.C. 20546
(202) 358-1600

For Release
July 22, 1996

Deanna Corridon
Headquarters, Washington, DC
(Phone: 202/358-1733)

VIDEO ADVISORY: V96-90

WHALE OF A FIND ON NTV MONDAY

On Monday, NASA TV will televise footage of the fossil remains of a 3.5-million-year-old juvenile baleen whale discovered on July 15, by two surveyors working at a piping trench at the Langley Research Center, Hampton, VA. The bones will be loaned to the College of William and Mary, Williamsburg, VA, for research.

ITEM #1: A WHALE OF A FIND
Ancient whale is unearthed at Langley Research Center.

ITEM #2: INTERVIEW - JOHN MOURING, MASTER PLANNER & PRESERVATION OFFICER, LANGLEY RESEARCH CENTER

ITEM #3: INTERVIEW - DR. GERALD JOHNSON, GEOLOGY DEPARTMENT, COLLEGE OF WILLIAM & MARY

For more information contact Michael Finneran at (804) 864-6121 or Don Nolan-Proxmire at (202) 358-1983.

Video news files air daily at noon, 3, 6, 9 p.m. and midnight EDT.

NASA Television is broadcast on Spacenet 2, transponder 5, channel 9, C-Band, located at 69 degrees West longitude, with horizontal polarization. Frequency will be on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

News Release

National Aeronautics and
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ANCIENT WHALE SURFACES AT NASA LANGLEY

Thanks to the sharp eyes of two surveyors, the fossil remains of a 3.5-million-year-old whale have been discovered at NASA's Langley Research Center, Hampton, VA.

The bones of the 30-foot juvenile baleen whale were found July 15 by two surveyors working at a piping trench under construction. The findings include a skull, tympanic bulla (part of the ear bones of a whale), vertebrae and rib fragments. More fossil remains are still to be unearthed.

Langley is loaning the remains to the College of William and Mary, Williamsburg, VA, for study, said John Mouring, Langley's facility master planner and preservation officer.

The discovery, considered rare but not unprecedented, opens a window into the history of the Langley site about 3.5 million years ago, when the Atlantic shoreline was probably 30 to 40 miles west of its present location and covered the Center, said Dr. Gerald (Jerre) Johnson of William and Mary's geology department.

"The research opportunity will provide insight into the development of whales through geologic time," Johnson said.

Preliminary work indicates the whale bones are the remains of an almost mature creature that died and was quickly buried on a broad, wave-swept sand shoal.

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The bones were about four feet below the surface of the ground in a reddish-brown sandy clay of the upper weathered part of the Yorktown Formation. The lower beds in the trench are sands comprised of broken marine mollusks, barnacles, and other groups. This soil grades upward into the weathered part of the Yorktown Formation containing the whale remains.

Shell material that once surrounded the whale has been dissolved away by groundwater. A gravel, sand and mud sequence overlies the whale-bearing beds; these were deposited in an ancestral Chesapeake Bay about 100,000 years ago.

The highly broken condition of most of the shells in the beds immediately below the whale tells of the strong wave and current activities that prevailed in the area when the whale came to rest on the sea floor.

Johnson said the chronological age of the whale is based upon the relative size of the tympanic bulla to the vertebra, and the degree of fusion of the plates on the central part of the vertebrae. Even though the jaw has not been found, the size of the ear bone indicates a baleen rather than a toothed whale.

The whale remains were discovered by two surveyors while a utility contractor, T.A. Sheets, dug an eight-foot-deep piping trench in the old rocket test area of the Center on the south side of Lewis Loop near East Bush Road.

The surveyors, Vanessa Butler and Kit Cain of Sverdrup Technologies Inc., a Langley contractor, were working in the area when they spotted two vertebrae and assorted rib pieces in the excavated Earth pile.

Knowing that Langley grounds are rich in prehistoric and historic artifact resources and that they are managed here by law, they took the bones to Mouring.

Mouring determined that animal remains not associated with an archaeological context do not require preservation in the federal system (except for Bureau of Land Management and National Forests). "This is paleontology - not cultural resources," he said. "If it is human-related (prehistoric or historic) it must be managed here at Langley under the National Historic Preservation Act."

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NASA Manager Earns Distinguished Executive Service Award

NASA Langley Research Center's Charles P. Blankenship, NASA program director for Advanced Subsonic Technology (AST), received a Distinguished Executive Service Award from the Senior Executives Association (SEA) and its Professional Development League at its Executive Excellence Awards Breakfast last month in Washington, D.C.

Blankenship, a 35-year veteran of federal service and a Langley employee since 1980, was cited for his "outstanding dedication and technical innovation" and "exemplary abilities in advocacy, planning and implementation."

In his work in aeronautics, Blankenship led the planning and integration of four key multiyear programs with the aeronautics industry, universities and other government agencies. The successful programs led to the development of cost-effective composite aircraft structures, structural test methods and computational model predictors for ensuring structural integrity of an aging commercial fleet.

Blankenship also led the planning and implementation of the Advanced Composites Technology program for subsonic transport aircraft wing and fuselage components, resulting in industry use of composites to reduce aircraft weight and maintenance costs.

His leadership has resulted in the development of airframe materials, structures and acoustics technology for the High-Speed Research and AST programs, as well as other major technology programs.

A graduate of Virginia Polytechnic Institute and State University, the Bluefield, W.Va. native has served as NASA Langley's Materials Division chief, Structures Program director and Technology Applications Group director. He was named AST program director last year.

The SEA is a professional organization that represents the interests of career federal executives. It aims to improve the efficiency, effectiveness and productivity of the federal government, to advance the professionalism and advocate the interests of career federal executives and to enhance public recognition of their contributions.

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