the astrogram

VOLUME XVII
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June 5, 1975

National Aeronautics and Space Administration • Ames Research Center, Moffett Field, California

Scale model of the Space Shuttle Orbiter currently undergoing testing in the Ames 40X80-Foot Wind Tunnel.

Space Shuttle tunnel tests

A one-third scale model of the Space Shuttle orbiter is undergoing wind tunnel testing in the huge forty-by-eighty-foot wind tunnel at Ames.

Purpose of the test is to gather low speed flight data in support of approach and landing tests of the first full-scale Shuttle orbiter at NASA's Flight Research Center in 1977. Another purpose is to calibrate the vehicle's air data probes.

One of the largest wind tunnels in the world, the "40 by 80" (from the size of its test section, 40 by 80 feet, or 12 by 24 meters) covers an area of more than two city blocks and is capable of testing aircraft at speeds of from zero to 230 miles per hour. The tunnel is powered by six 6,000 horsepower electric motors (total 36,000 horsepower) driving 40-foot diameter wooden propellers. The tunnel was completed in 1944 and more than 100 major aircraft designs have been tested in its test section.

The Space Shuttle is a reusable space vehicle under development by NASA which will be operated as a transportation system for a wide variety of space missions in low Earth orbit. It will be operational in the early 1980's after orbital testing in 1979. The Space Shuttle system consists of a reusable orbiter, a delta-winged, airplane-like craft approximately the size of a DC-9, mounted piggy-back at launch on a large expendable liquid propellant tank and two recoverable and reusable solid propellant rocket boosters. It is a scale model of the orbiter portion which is being tested at Ames.

The Shuttle is being developed to substantially reduce the cost of space operations through providing a vehicle system that will have the capability to launch, repair, service, retrieve and replace many different types of payloads, as well as support manned space activities for up to 30 days. Payload of the Space Shuttle will be [illegible] kilograms (65,000 pounds). It will be launched vertically, like today's launch [illegible], but will land horizontally on an airport runway, like an airplane.

The overall length of the scale orbiter is 13.1 meters (43.9 feet) long, compared to 37.19 meters (122 feet) for the full scale vehicle. The one-third scale model weighs about 20,400 kilograms (45,000 pounds). It is equipped with remotely controlled elevons, body flap, and speed brake and rudder panels on which the control surface seals and gaps have been simulated.

The model was built by Rockwell International Corporation's Aircraft Division in Los Angeles. Rockwell's Space Division, in Downey, California, is developing the Space Shuttle orbiter and integrating the complete Space Shuttle system for NASA.

NASA's Johnson Space Center, Houston, Texas, manages the Space Shuttle orbiter development program.

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3. Copying requests by non-government, on-site personnel must be approved by the appropriate ARC monitor or the monitor's supervisor.

(Continued on Page 2)

CDP nominees

Six Ames employees have been nominated to participate in the 1975/76 NASA Career Development Program (CDP) for a one-year work assignment at Headquarters. Forth-three host positions were announced. Of this number, 23 will be filled by participants selected from throughout the Agency. Three of those selected will be Ames candidates.

Nominees from Ames are: Charles A. Castellano, Advanced Vehicle Concepts Branch; Calvin J. Fenrick, Equal Opportunity Program Office; William P. Gilbreath, Materials Science Branch; Eugene R. Pucine, Scientific Applications Analysis Branch; Kenneth A. Souza, Biological Adaptations Branch; and Kenneth C. White, Guidance and Navigation Branch.

The CDP is an important element in NASA's overall people development program. It is open to all employees in grades GS-11, 12, and 13. All nominees are considered and the selection criteria is the same for each applicant.

At the present time there are five Ames employees on a one-year assignment at NASA Headquarters. Those selected for participation in the 1974/75 CDP are: Betty K. Berkstresser, Richard M. Brown, Demo J. Giulianetti, John W. Vorreiter and Roger A. Craig.

Viking emblem design

The emblem the Viking lander will carry when it is launched later this summer was designed by Peter P. Purol, a high school junior from Baltimore, Maryland. Purol is the national winner of the Viking Student Emblem Contest sponsored by NASA and the National Science Teachers Association. Along with Purol's emblem, the Viking lander will carry the American flag and the American Bicentennial design. The craft's television cameras are expected to photograph the student-designed emblem as panoramic views of the Martian surface are sent back to Earth.

The emblem, designed in red, white and blue, links the Vikings of old with the Viking to Mars.

The winning emblem was selected by NASA Administrator, Dr. James C. Fletcher on the recommendation of a specially formed Selection Committee.

Keep

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August 14, 1975

National Aeronautics and Space Administration • Ames Research Center, Moffett Field, California

Charles Hall-Golden Plate Award

Ames Research Center's Charles Hall was recently awarded the prestigious "Golden Plate" for outstanding achievement. Hall was among fifty persons selected nationally by the Academy of Achievement, a non-profit organization which seeks to bring American youth into contact with adults who have made significant contributions in their fields. Recipients included such celebrities as Colonel Sanders, Willie Mays, Jim Nabors, and Werner Von Braun.

Mr. Hall, an Ames employee since 1942, was nominated by NASA's Dr. Fletcher for his work as Project Manager of Pioneers 10 and 11. The Pioneer spacecrafts have provided scientists with basic information about the environment of Jupiter, including the first close-up photos to have been taken of the planet. Pioneer 10, which determined the severity of radiation in Jupiter's environment, receiving about 50 times the lethal dose for human beings, will be tracked until 1980, when it will disappear from our solar system. The spacecraft will be approximately two billion light years from earth before contact is lost! Pioneer 11 is heading for Saturn, and is expected to arrive in 1979.

"It's an exciting job," says Mr. Hall about his work as Pioneer Project Manager. "There's never a dull moment and there's always a new challenge every day." Trained in engineering at U.C. Berkeley, Hall was involved in aerodynamic research before becoming interested in the solar probe project in 1960. The solar probe evolved into an interplanetary monitoring project and Hall has taken an active part in the Pioneers ever since. "It's always satisfying to work towards a single objective for several years and then have it realized," he says. Though Hall has never attended a Pioneer launching personally, "I'd have to be a corpse not to be excited."

Being Pioneer Project Manager has included several hair-raising moments. One of these moments occurred when a Radio Isotope Thermoelectric Generator failed to deploy on Pioneer 11 because of an unexpected mechanical malfunction. Commands had to be sent to shake the spacecraft loose from a bent rod. Another threat to Pioneer 11 was an unexpected strike called by the workers on an Australian station vital to the project. Hall and his colleagues had only thirty minutes notice in which to re-plan the mission so it could continue. Perhaps the worst moment in Pioneer history was the fate of Pioneer 5, which turned 1-3/4 times in the air during the second stage of launching and proceeded to head for Brazil. Part of the spacecraft had to be slown up two minutes after launching and now rests in the Atlantic Ocean. "That kind of thing takes a lot out of you," Hall comments.

How does he keep calm when faced with such awesome responsibility? "The important thing is to figure out the problem and to get a solution as quickly as possible – though sometimes it gets awfully frustrating. You hope for the best and prepare for the worst."

Wind Tunnel Accident

An accident at Ames Tuesday evening, August 5, resulted in extensive damage to one of the major wind-tunnel facilities.

At approximately 9:40 p.m., during a routine test in the center's three-and-one-half-foot hypersonic wind tunnel, a steel flange apparently failed, resulting in an explosion-like release of high pressure air. The blast of air scattered hundreds of 3/4-inch aluminum oxide pebbles heated to 1600° F over a wide area, starting several fires.

The fires caused only minor damage, but the blast itself caused major damage to the facility. Injuries were limited to a scratched nose suffered by a workman as he dived under a desk.

The 3-1/2 foot hypersonic wind tunnel is of the closed circuit, blow down type. Test air at 1800 psi (pounds per square inch) is heated by a storage heater which consists of a bed of aluminum oxide pebbles which are heated in turn by a natural gas heater. The tunnel normally operates at test velocities of up to Mach 14 (14 times the speed of sound) and will accept models of up to approximately 3-1/2 feet in cross section.

Extent of the damage and the length of time the facility will be out of service have not been determined.

An investigation board has been formed. The board will review the events leading to the incident, determine the most probable cause and make recommendations to guard against a recurrence.

NASA/ISRO transmit programs to India

A one-year experiment began August 1 by the Indian Space Research Organization (ISRO) and NASA in use of a space satellite to transmit instructional television programs to thousands of isolated villages throughout India.

The spacecraft is NASA's Applications Technology Satellite-6 (ATS-6), the largest and most powerful communications satellite ever developed. It is positioned 35,900 kilometers (22,300 miles) over east Africa and controlled from Goddard Space Flight Center, through a ground station in Spain.

The programs, produced by India, stress improved agricultural techniques, family planning and hygiene, school instruction and teacher education and occupational skills. Some four hours of broadcasts a day are scheduled.

About half the 5,000 villages in the experiments are equipped with TV sets augmented by converters and small antennas to receive the signal directly from ATS-6. The others receive the signal after it is rebroadcast from a ground terminal in the area.

NASA responsibilities in the Satellite Instructional Television Experiment (SITE) include provision of operating time on the ATS-6 communications system as well as positioning and pointing of the spacecraft.

All other aspects of the experiments, including the design, development and maintenance of the ground transmitting and receiving stations and all programming, are the responsibility of India. ISRO is producing all the hardware, while All India Radio (AIR) of the India Ministry of Information and Broadcasting has prime responsibility for the programming.

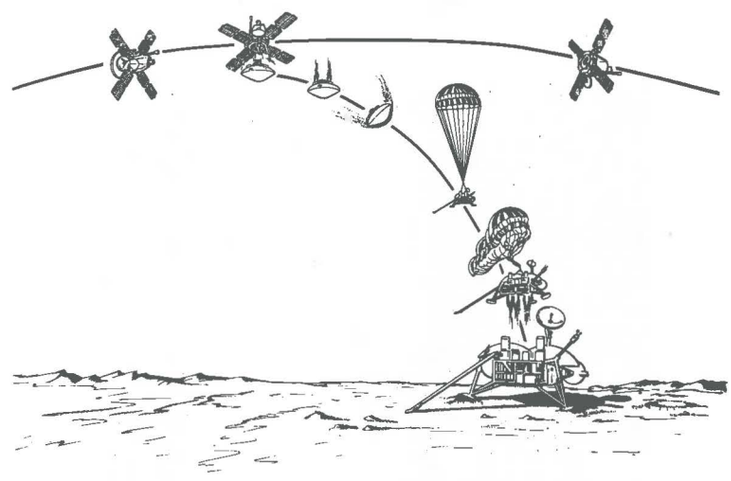
The primary Indian ground station for transmission is located at Ahmedabad and a secondary station is in Delhi.

During SITE, a number of experiments initiated during ATS-6's first year of operation in range of the United States will be continued. These include aeronautical and maritime communications, studies of atmospheric effects on radio transmissions and scientific investigations.

Also during the first year, following its launch in May 1974, the satellite carried out pioneering demonstrations of medical and educational TV transmissions, sponsored by the Department of Health, Education and Welfare and the Veterans Administration, to remote communities in Alaska, the Rocky Mountains and Appalachia.

After its year over Africa, ATS-6 will be repositioned over the Western Hemisphere for a third year of similar experiments.

Viking's approach to Mars



This artist's concept shows the sequence of events as the Viking spacecraft approaches the planet Mars in July, 1976. When it reaches the planet, each spacecraft divides into an Orbiter and Lander. Shown, left to right: Bioshield separation, Lander capsule separation, the descent, parachute deployment, terminal propulsion and entry to landing as the Orbiter circles the planet. Two Viking spacecraft were launched from Cape Canaveral – the first on August 11 and the second will go up on August 21.

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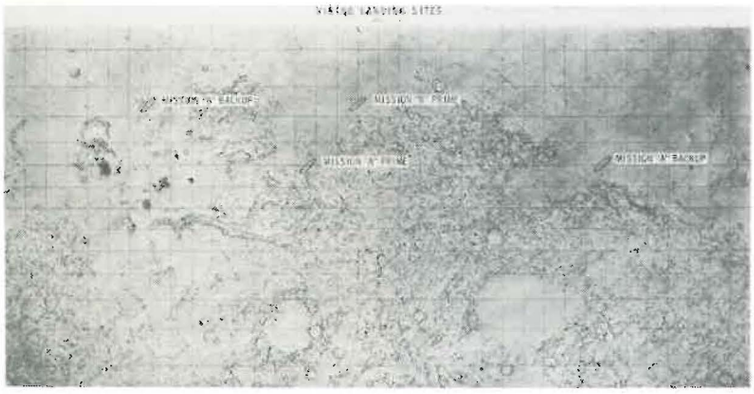
National Aeronautics and Space Administration • Ames Research Center, Moffett Field, California

Ames/Viking Atmosphere Experiment



Landing Sites: The regions indicated on this map of Mars have been tentatively selected by NASA as the primary and backup landing sites for the two Viking spacecraft. They will journey for almost a year through space before arriving at Mars.

In previous issues, the Astrogram has reported on the important role of Ames investigators in the Viking Life Detection Experiment. It is less widely known that this Center has another experiment on the Viking Landers, to measure the properties of the atmosphere of Mars.

This experiment grew out of an idea for measuring the atmospheres of the planets by means of probe vehicles during high speed entry, originally advanced in 1962 by A. Seiff of this Center. Now, developed and expanded by Ames research and development, it has led to a set of in-situ measurements to be made on board the Viking entry vehicles which will define for the first time a number of properties of the atmosphere of Mars, at altitudes extending up to 100 km (60 miles).

The PAET flight test was a precursor evaluation and demonstration of the experimental techniques to be used at Mars. These same techniques will be applied by the same investigators on each of the four entry probes of the Ames managed Pioneer Venus Mission.

The experiment is called the Viking Atmosphere Structure Experiment, and it is one of three separate investigations which have been prepared by members of the Viking Entry Science Team. Team Leader is Professor Alfred Nier of the University of Minnesota. Team members are A. Seiff (ARC), W. Hanson (U. of Texas), Michael McElroy (Harvard), and N. Spencer (GSFC). Professor Nier is lead investigator for measurements of the composition of the upper atmosphere, above 100 km, by use of a mass spectrometer. Professor Hanson will measure the number densities and energies of ions and electrons behind the planetary bow shock wave and in the ionosphere, and identify the ions, by means of a Retarding Potential Analyzer. Mr. Seiff is lead investigator for the Atmosphere Structure Experiment, described below. Professor McElroy and Mr. Spencer are Team theoreticians, with Mr. Spencer's area of specialization being mass analysis of the atmosphere.

The primary objective of the Atmosphere Structure Experiment is to determine the profiles of atmospheric temperature, pressure, and density with altitude, by combined use of accelerometers, pressure and temperature sensors, and a radar altimeter. Vertical and horizontal wind velocity determinations will be made from these same instruments, supplemented by the guidance system gyros and a Doppler radar used to guide the spacecraft to a soft landing. The mean molecular weight of the lower atmosphere will be deduced from the data, as will the terrain profiles under the landing track; and the acceleration due to gravity at the landing site will be measured to define the planetary radius there, and thus the elevation of the landing site relative to the mean radius.

These data will respond to some of the outstanding questions concerning the atmosphere of Mars. The state properties (temperature, pressure) have been deduced for altitudes below 45 km on earlier Mariner missions, from remote sensing, but the data show large scatter (or variability), and indicate that the atmosphere cools below the condensation temperature of its principal constituent, CO_2, above 30 km altitude, an unlikely result. The mean surface pressure has been deduced from flyby and orbiter observations to be 6 mb (0.6% of that on Earth). Based on these data and independent measurements of the quantity of CO_2 present, it has been concluded that the atmosphere is at least 90% CO_2. However, there are some recent indications, from Earth-based spectroscopy and the short-lived Russian entry probe, Mars 6, that substantial amounts of argon may be present – 30% to 70% of the atmosphere – which would be consistent with a potassium fraction in the planet's crust comparable to that in the Earth's crust. These and other first order questions on the nature of the atmosphere of Mars should be resolved by the experiment.

The winds on Mars are apparently very stong, fast enough to raise plant-wide dust storms, in spite of the tenuous atmosphere. (This remains to be understood.) The winds are also instrumental in transporting large quantities of solar heat from the equator to the poles. Present knowledge of the winds is, however, very sketchy, and almost entirely based on numerical modeling rather than measurements. The Atmosphere Structure Experiment is expected to yield data on the velocities and their profiles with altitude above the two landing sites, against which the numerical models can be compared and validated, or adjusted, for more confident extension to the rest of the planet.

The Experiment is carried on the two Viking landers of the A and B Missi[illegible]. These are launched 10 days apar[illegible] the landing times are 60 days apart, and the landing latitudes are nominally 20°N and 44°N, both in the summer hemisphere.

Ames personnel who have played an active part in developing this Experimen[illegible] and evaluating the instruments includ[illegible] Si Sommer, Donn Kirk, Robert Corridan, Peter Intrieri, Murray Gardner, and Steve Hing. The Walter V. Sterling Company, under Ames R & QA, has supported the experiment preparation significantly by running numerous tests of the instruments.

US/USSR meeting at Ames

A ten-day meeting between U.S. and U.S.S.R. space officials at Ames began August 18 with an agenda covering medical and biological aspects of spaceflight.

The U.S./U.S.S.R. working group for space biology and medicine is part of the agreement on cooperation in space signed in 1972 by President Nixon and Chairman Kosygin. The group has met on five previous occasions, alternating their missions in each country.

The co-chairmen of the joint meeting are Dr. D.L. Winter, Director of Life Sciences for NASA and Dr. N. Gurovsky of the Ministry of Health of the U.S.S.R.

In the photo above are the U.S./U.S.S.R. space officials. They are (left back to front) Dr. A.M. Glotov, Dr. E.A. Savina, Dr. R.A. Tigranyan, Dr. I.I. Bryanov, Dr. A.V. Yeremin, Dr. N.N. Gurovsky, Mrs. G. Ya. Tverskaya, Dr. N.M. Rudniy, Dr. E.A. Ilyin, Dr. Y.M. Svirezhev, and Mr. N.S. Novikov. Right back to front are Mr. R. Lavroff, Dr. R.C. Simmonds, Dr. A.E. Nicogossia, Dr. L.F. Dietlein, Dr. H.P. Klein, Dr. R.R. Hessberg, Dr. D.L. Winter, Mr. R.S. Johnston, Dr. J.C. Sharp, Mr. L.P. Chamber, Dr. H Sandler, and Mr. P.A. Thibideau.

National Aeronautics and
Space Administration
Ames Research Center
Moffett Field, California 94035

NASA

The Astrogram

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Jupiter's tail believed enormous

Pioneer 10 sensors have indicated that Jupiter has an enormous magnetic tail, almost half a billion miles long, completely spanning the distance between the orbits of Jupiter and Saturn.

Pioneer 10 is on its way out of the solar system and crossed the orbit of Saturn in early February. Spacecraft sampling data shows that Pioneer was solidly in Jupiter's tail for at least 24 hr in mid-March. For 5-hr periods before and after the apparent encounter with the tail, the spacecraft was not programmed to return tracking data and may have been partially in the tail's influence, says Pioneer project scientist Dr. John Wolfe.

During the 24 hr in the tail, the spacecraft's solar wind instrument registered zero because the tail's magnetic envelope structure shut out the solar wind completely. Calculations show that Pioneer was in the proper position to intercept the tail, about 1 deg to the right of the Sun-Jupiter line. This bias is due to Jupiter's orbital velocity.

"It is just barely conceivable that the solar wind could have died completely for a whole day without our being in the tail, and we'll know more when we have complete tracking data," Dr. Wolfe said, "but we believe we've found that Jupiter has a very stretched-out magnetic envelope or tail" (see drawing).

Scientists had speculated that Pioneer might be in a "magnetic bubble" broken off from the tail, but Wolfe now believes that because of the long time of zero solar wind, Jupiter has an intact tail stretching all the way from Jupiter to Saturn.

"The cylindrical tail may expand as it goes out," Wolfe says. "It may be even larger than the nine-million-mile diameter of Jupiter's magnetic envelope at the planet because the solar wind density is down four times by the time you're out to Saturn's orbit," he says. *(Continued on Page 5)*

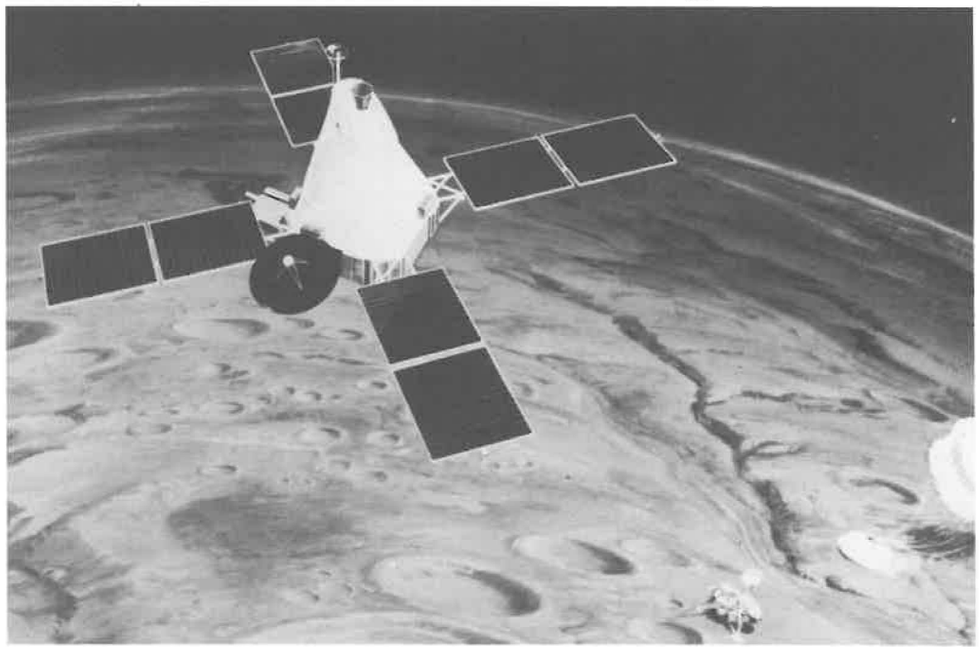
New EEO counselors

Center Director Dr. Hans Mark has selected the following personnel as new counselors: Bea Morales, Audrey Summers, Pat Kirk, and Henry Mack.

The new counselors will take over the counseling duties previously performed by Sheldon M. Smith, Lewis A. Turner, Dorothy M. Davenport, and Allison Ybarra.

Equal Employment Opportunity counselors serve as a bridge between employees and management and have the responsibility for establishing an open and sympathetic channel through which employees may raise questions, discuss grievances, obtain answers, and, on an informal basis, resolve problems connected with equal employment opportunity. The counselor's role is an integral part of the total EEO Program, and it is essential that the role of the counselor is understood and supported by all Center personnel at all levels.

Mars atmosphere study scheduled for Viking



After an 11-month journey through 736 million kilometers (460 million mi) of space, the Viking Lander will have just 5 minutes to profile and analyze the Martian lower atmosphere.

Developed at Ames Research Center, the Lower Atmosphere Structure Experiment will produce a profile of the temperature, pressure, and density of the last 100 km (60 mi) of the atmosphere as the Lander rapidly decelerates from about 4,500 m/sec (10,000 mph) to a gentle 3 m/sec (6 mph) touchdown on Mars, July 4 at 9:41 p.m. EDT.

The experiment is one of three separate investigations prepared by members of the Viking Entry Science Team. The other investigations will analyze the composition of the gases of the upper atmosphere and measure ion and electron energy during Mars entry to determine ion type and concentration.

Alvin Seiff, lead investigator of the Lower Atmosphere Structure Experiment, Ames Space Science Division, expects the study to solve some puzzles about Martian winds and atmospheric temperature and pressure.

Ninety m/s (200 mph) winds appear to cause periodic planet-wide dust storms on Mars, but present knowledge, based on numerical models rather than direct measurements, doesn't predict winds of that intensity. Horizontal wind velocity measurements and atmospheric temperature readings at different altitudes will help explain wind dynamics.

Seiff feels that besides answering basic questions about the Martian atmosphere, the investigation will broaden our view of our own atmosphere. After the Viking mission, scientists may better understand the circulation of the Earth's atmosphere, which determines our weather and the behavior of our polar caps, which mark the coming and going of the ice ages with their growth and recession.

Mars' polar caps grow and receded seasonally as they condense and evaporate carbon dioxide.

An accelerometer on the Lander will measure the craft's rate of deceleration through the Martian atmosphere. Scientists can determine the density of the atmosphere from the Lander's size, shape and weight and its deceleration rate. Data from tests of Lander models fired through carbon dioxide atmospheres in Ames ballistic ranges are used to calibrate this measurement.

Atmospheric pressure and temperature can be derived mathematically from the density. During the descent from 100 km (60 mi) to 25 km (15 mi), the density, pressure, and temperature profiles will all be derived from the accelerometer measurements.

As the Lander falls to within 25 km (15 mi) of Mars, direct sensing of temperature and pressure will begin. The aeroshell stagnation pressure instrument and the recovery temperature instrument on the Lander's aeroshell continually sample the air as the Lander races down through the Martian atmosphere.

The pressure instrument contains a thin diaphragm that bends with increasing pressure. The movement converts the pressure into an electrical signal much like the function of a microphone diaphragm.

During the final 6 km (200,000 ft) of the Lander's descent, the aeroshell is cast off and the *(Continued on Page 3)*

Jetsetters news

Beginning May 1, the Ames Jet Setters are offering employees a new program through California Host. This will be a continuing program as long as interest is shown in it. There will be no individual publications of notices; all planned events will be published in the Astrogram on a continuing basis and individual trip descriptions will be posted on the building bulletin boards as the events are offered. A separate page "Request for Expression of Interest" is incuded with this copy of the Astrogram so that only trips of interest to the employees will be considered. Please circle *12* events listed in which you would participate and return the questionnaire to M/S 206-3.

his program is offered to all persons employed at Ames, retirees from Ames, and their friends.

–A California Host escort will be on board all motorcoaches. Transportation will be provided from Moffett Field to destination and return to Moffett Field. All prices quoted are per person, double occupancy. Reservations/payment must be received not later than two (2) weeks prior to the announced trip. Payment must be sent to Marian Davis, Room 102, Bldg. 206 (M/S 206-3 – Ext. 5832). All checks must be made payable to the NASA-Ames Jetsetters.

To get the program started, the following trips are offered:

21–23 May – SOUTHSHORE, LAKE TAHOE – Price $41. Includes motor transportation, two nights accommodations, $17 value refund, complimentary wine. Cut-off date – 6 May 1976.

19–20 June – MENDOCINO AND THE SKUNK TRAIN – Price $39. Includes motorcoach transportation, one night accommodations, Skunk Train ride, complimentary wine. Cut off date – 3 June 1976.

2–7 July 1976 – BICENTENNIAL Boston, New York, Philadelphia, Washington DC
22 Oct – 7 Nov 1976 – HONG KONG (Contact Guy Wong at Ext. 6022)

Jetsetters request expression of interest

JET SETTERS REQUEST EXPRESSION OF INTEREST

All employees are requested to indicate which of the programs listed below are of interest to them and in which they would participate. Every effort will be made to include these programs in the Jet Setters itinerary for the oncoming months.

Please circle *only 12 of the programs* in which you have interest and return this questionnaire to Mail Stop 206-3.

Gambling Trips

e Tahoe
Reno
Las Vegas

Professional Sports – Games

Football
Basketball
Hockey
Soccer
Tennis Tournaments
Golf Tournaments
Crosby Tournament (Jan)
Deep Sea Fishing
Sailing – 36' Sloop on Bay
Canoe Trips on Russian River

Musical Events

Opera
Musical Productions
Stage Plays
Monterey Jazz Festival
Mozart Festival
Carmel Bach Festival
San Francisco Nitelife Tour
Concerts

One Day Outings

Victorian House Tour
Adobe House Tour in Monterey
Dicken's Faire – San Francisco
Horse Races
Napa Valley Wine Country
Sausalito – Tiburon
Art Festivals
Dinner Cruises
Antique Shows
Hobby Shows

Get-Away Weekends

San Simeon – Hearst Castle
Solvang – Danish Community
Mendicino Coast – Skunk Train
Monterey – Carmel
Yosemite
Tahoe Snow Trip
Ski Trips
Pajaro Dunes
Palm Springs
Catalina
Historical Tours

Exploring Weekends

Gold Country
Art Galleries – Carmel
Redwoods
Desert
Mission Tours

Club House Activities

Bridge Parties – Weekly? – Special?
Guest Speakers
Wine Tasting
Brunches
Dinners – Potlucks
Holiday Get-togethers

Number of Trips per Month Desired: One Two

These programs are offered by California Host. They have escorts, serve wine, can arrange special events, and can offer discount rates to all events.

Iong Kong

A 16-day trip to Hong Kong with optional side trips is being offered on October 22, 1976 at a cost of $699.

A slide presentation on the highlights of the trip will be shown in Building 213, Conference Room (Room 261) at 11:30 a.m., Tuesday, May 4, 1976 by Guy Wong.

Reservations may be made by contacting Guy Wong at his office or at his home (415) 322-7612. A deposit of $100 per person must be received by him not later than May 25, 1976 for those desiring to make the trip and to confirm reservations.

Travel insurance

Here is protection when you are traveling, whether it's to and from work, on shopping trips, running crosstown errands, chauffering the kids to school, vacationing, or taking business trips (local or world-wide, depending on plan selected).

BENEFITS AND COST

(Employee chooses the Plan and Amount of coverage he wants. Coverage for spouse is optional.)

	Plan I Personal Travel and Local Business Travel		Plan II Personal Travel and Worldwide Business Travel	
	Amount	Annual Cost	Amount	Annual Cost
For Employee	$25,000	$7.50	$25,000	$16.25
	50,000	15.00	50,000	32.50
	100,000	30.00	100,000	65.00
Spouse	10,000	4.50	10,000	4.50

Contact the Training Office for further details, Bldg. 241, Room 138, ext. 5626.

NAS open house

Confirming recent discussions, ARC will display research aircraft at the forthcoming NAS Moffett Field Open House on May 8 from 10 a.m. to 5 p.m. The aircraft will be positioned for static display on the Navy apron with posters or descriptive material describing the aircraft and its role in NASA research programs. The cognizant project office will be responsible for furnishing these materials to Cy Sewell who will position the aircraft and set up displays. There is no requirement for the aircraft to be manned with project personnel as spokesmen, but if individuals wish to so participate, their efforts would be welcome.

The Aircraft Operations Division and the Applications Division will position the aircraft; Lt. Cdr. Stew Robinson (966-5315) is the contact for aircraft positions. Both Divisions should provide for ground crewmen to remain in the vicinity of the aircraft.

Aircraft proposed for display are: C-8 Buffalo, C-141, CV-990, UH-6 (Army), Lear 705, Twin Otter, X-14, and U-2.

Physical security of the aircraft will be coordinated by Ralph Maines of the Ames Security Office.

Mars *(Continued from Page 1)*

Lander's parachute opens. A new set of temperature and pressure sensors being working. The second temperature sensor is on one of the Lander foot pads while the pressure sensor, inside the Lander, makes contact with the atmosphere through a tube extending out of the Lander.

Pressure studies will help scientists determine what gases besides carbon dioxide the Martian atmosphere holds. The presence of argon is now considered likely. If even a trace of nitrogen is found on Mars, the odds for existence of some life form will greatly improve.

Women's news and views

by *Susie V. Rydquist*

Woman of the Year Award

Dr. Nancy G. Roman, Chief, Astronomy/Relativity Branch, Astrophysics Programs, Office of Space Science, NASA, was one of the outstanding leaders in science nominated for the prestigious awards made by the Ladies Home Journal.

Hispanic Woman of Note

Sor Juana Ines de la Cruz (secular name – Juana Ines de Asbaje, born 1651, San Miguel Nepantla, Mexico; died 1695, Mexico City) was an outstanding lyric poet of Mexico's colonial period. An intellectual prodigy, she begged her parents to disguise her as a boy in order to be able to attend the University of Mexico, but had to be content with reading her grandfather's books. At age 9, she went to live in Mexico City where she studied Latin, mastering the language in 20 lessons. The fame of her learning reached the Viceroy, who invited her to court where her wit and magnetic personality won her great popularity. In an oral examination arranged by the Viceroy, Juana Ines (then 17) astonished 40 professors with her knowledge. The three volumes of her work were printed in Spain. She died the victim of an epidemic, while nursing her sister nuns. (From La Mesa Redonda, Civil Service Commission.)

Credit Information

"Borrowing Basics for Women" is a free booklet from the First National City Bank, Public Affairs Dept., 339 Park Ave., New York, New York 10022. This booklet serves as a guide for women in building credit history, getting loans, obtaining credit rating, and answering typical questions that confront women such as: Can a divorced woman list alimony as income when applying for a loan; is a married woman liable for her husband's debts; or can a pregnant woman or homemaker get credit. . .?

Sociologist Elwood Carlson in a recent study at the University of California, commented that "while it may not always have been so, it seems today that work for women is coming to be associated with stable rather than unstable marriages" despite cliches that working wives tend to have trouble keeping job and family intact.

Mothers to Blame

The American Psychiatric Association has not listed male chauvinism as a certifiable psychiatric illness. In an article "Some Dynamics of Male Chauvinism", Sherwyn M. Woods writes "Male chauvinism refers to a blind allegiance and simpleminded devotion to one's maleness that is mixed with open or disguised belligerence toward women." However, Woods blames mothers as responsible for the male chauvinism of their sons and that a number of wives had "chosen male chauvinists in order to meet their own emotional needs."

Equality – Costly

In the first quarter of Fiscal Year 1976, $4,500,000 was paid for violations of the Equal Pay Act, an increase of 31% over the same period in 1975. Most of the payments went to women.

The Viking search for life

Author of this story is Wally Ravven, a journalism graduate student at San Jose State University, working at NASA Ames under a Science Writing Fellowship.

Eight days after the Viking Lander touches down on Mars, the miniature biology laboratory onboard will begin searching for signs of life. A jaw-like scoop on the end of a 10-foot boom will dig soil out of the Martian land and dump it into a funnel above the Biology Instrument.

Inside this one-cubic-foot package, three separate life detection experiments will offer different environments to Martian soil samples by varying the light, water and nutrients they receive. All three experiments will measure metabolism of any organisms living in the Martian soil. Dr. Harold P. Klein, Director of Ames' Life Sciences organization, heads up the three life detection experiments package.

The compact Biology Instrument weighs only 35 pounds and houses all of the electrical and mechanical parts needed to control the biology experiments 200 million miles from Earth.

The instrument contains 43 heaters, four thermoelectric coolers, 39 miniature latching solenoid valves and over 40,000 other electronic parts.

The search for life on Mars is a search for signs that minute organisms are growing and reproducing in the Martian soil. On Earth, these life processes require energy, and the Viking biology experiments assume that Martian organisms share this basic requirement.

Plants and other photosynthesizers on Earth tap the sun's energy and convert it to chemical energy to power all the biochemical reactions necessary to grow and reproduce. Animals and other non-photosynthesizers must take in energy-rich food and break it down (metabolize it) to obtain the energy they need for growth and reproduction.

(Continued next issue)

Security tip

Recently, several Ames employees have been denied entry to the Center by the Marine sentries at various gates. Entry was denied because the vehicles being driven did not comply with safety or equipment provisions of the California Vehicle Code.

All employees are reminded that, according to Naval Air Station Moffett Field Instruction 5560.15E, vehicles must comply with provisions of the California Vehicle Code.

Marine sentries are alert for vehicles not properly equipped or ones which present a safety hazard, and the sentry is empowered to deny the vehicle entry to the Center.

In instances where the driver disagrees with the improper equipment or safety determination by the Marine sentry, he should contact the Moffett Field Police at 966-5141 for a final decision.

Items most often cited as improper or unsafe are no license plate, no bumper, unsafe fenders due to an accident and broken or no headlamps. In addition, decals not permanently affixed to the vehicle may be confiscated.

RVing enthusiasts

Dick Fish of the Chemical Research Projects Office is an avid participant in "RVing" (RV refers to Recreational Vehicle). The following article caught the eye of another Ames employee who felt it would be fun to share it with others at the Center:

"Chapters are really family extensions," commented Dick Fish, Northern California state director, who with his wife Kay lives in San Jose and is a member of the Camino Cavaliers.

At one meeting, Dick added, a representative of the California Department of Parks and Recreation commented that people are not doing enough with their families. Dick sees the club as playing a role in precisely this area – giving a person a sense of belonging to a larger group.

One of the reasons the Fishes traded their camper for an Establishment mini motorhome last September was that the mini would give them seating room to entertain eight to 10 people and conduct Good Sam business. (Kay acts as state secretary.)

Dick and Kay travel about 11,000 miles a year, some of that mileage being accumulated when Dick uses the rig in his work as a NASA research scientist. Among the hobbies he pursues while RVing are hunting, fishing and backpacking.

Mendenhall *(Continued from Page 1)*

She has been a participant in GSA's executive development program, a participant at the Commission's Executive Seminar Center at Kings Point, a nominee for the National Civil Service League Award, and a candidate for a Congressional Fellowship.

While serving as Women's Program Coordinator in GSA from 1970 to 1973, she developed and put into operation a women's program of national scope. In that job, she persuaded her agency to open building guard jobs to women, 6 months before the Commission ordered other agencies to take similar action.

Ms. Mendenhall will be in the Bay Area July 7–11, where she will be an active participant in the annual convention of Federally Employed Women, and in particular, the conference, call South Bay Chapter President, Ms. Anita Enander, at 323-8111, ext. 2328.

Office notice

Copies of Ames' FY76 Affirmative Action Plans are available to any interested employee. Call the EOP office at ext. 6510 to have one sent to you.

Communications

WANTED by Communication Branch: Current phone extensions of all resident personnel. Contractors and all others use ARC 45. Directory Change Notice.

Joggernauts

George Lenehan, President of the Ames Joggernauts, became the third Ames jogger to crack the 5,000 mile barrier. Paul Sebesta and Art Mandell were the first and second joggers to register 5,000 miles. Other joggers crossing milestones are Bob McCracken – 2,500 miles; Bruce Ganzler, Ron Mancini, Jim Connolly, and Gerald Malcolm – 1,000 miles; Betty Berkstresser and Herb Finger – 500 miles.

National Aeronautics and
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Keys

NASA

The Astrogram

UME XVIII NUMBER 21 July 1, 1976

VA award for Hernandez

Roger Hernandez, Ames Reproduction Branch was recently awarded a special certificate by the Veteran's Administration in recognition of 1,000 hours of active participation in the VA volunteer service program. Hernandez, a volunteer for 16 years, works out of the VA hospitals in Palo Alto and Menlo Park.

In 1970, Hernandez received a letter from President Nixon commending him on his efforts in setting up a program to help rehabilitate family members of blinded veterans.

Credit union declares 6.25% dividend

The Moffett Field Employees Credit Union has ed a 6.25% dividend for the period January 1, through June 30, 1976. This is the highest dend ever paid according to John F. Pogue, President of the Board of Directors, and reflects a continuing growth in the Credit Union. This dividend will be posted to member accounts on July 1, 1976.

Mr. Pogue also stated that the Board of Directors has adopted the policy of compounding dividends on a quarterly basis, effective July 1, 1976. Thus, each quarterly statement will reflect the dividends for the preceding 3 months. This decision to pay quarterly gives our members a clearer indication of their earnings on savings and keeps pace with other financial institutional customs.

Women's news: brown bag lunch

On July 7, 1976, the Women's Advisory Group will hold its July Brown Bag Luncheon.

At this time, Sister Jane Miller, Chairman of the History Department of Lone Mountain College, San Francisco, California, will speak on "Role of Husbands in the Growth of the Women's Movement." Sister Miller has her Ph.D. from Stanford University and has been on the faculty of Lone Mountain College since 1937, serving for the past several years as man of the History Department. She has just ted a book on the above subject and this will e an opportunity for Ames personnel to gain some historical perspective on the growth of the movement and the dominant figures in its development.

This session will take place from 11:30 to 12:30, July 7, in the Space Sciences Auditorium, Building 245.

NASA requests space industrialization studies

Two types of companies have been invited by NASA to make proposals for studying a broad concept of future research, development, and operations activity known as "space industrialization."

Space industrialization is defined as space activities which are undertaken primarily for the production of goods and services which are of major economic benefit. This next phase of the space program is the logical extension of most of the space work undertaken to date – mostly for scientific or exploratory purposes.

The Marshall Space Flight Center, working under the direction of the NASA Office of Space Flight, expects to award contracts for two parallel studies which will lay the necessary groundwork for an evolutionary space industrialization effort covering the period 1980–2010. One of the contracts will be awarded to an aerospace firm and the other to a research or "think-tank" company.

The main objective of this study effort is to develop an evolutionary space industrialization program which could lead from Shuttle-Spacelab and early space station experiments to permanent, practical, commercial use of space.

Areas of potential include electrical power generation and unique manufacturing processes which can only be done in the weightlessness of space, or can be done far better in space than on Earth.

Prospective activities include the manufacture of materials, chemicals and medicines, development of new materials and processes, new communications industry, weather services, new Earth resources development, ultimately the movement of people to space for tourism or medical purposes and the eventual industrialization of the Moon.

The proposed work is divided into two phases, each requiring about 8 months and the contracts will cost an estimated $200,000 each. Requests for proposals were issued by the Marshall Center with proposals due June 29. Contracts will be awarded this fall.

STA delivered to JSC

The first of two Space Shuttle training aircraft (STA) has been delivered to Ellington Air Force Base, Texas, for use by Johnson Space Center in Shuttle crew training.

The STA is a modified Grumman Gulfstream II twin engine jet aircraft that will be used in crew training to simulate the flight characteristics of the Space Shuttle Orbiter.

Johnson Center personnel will conduct a receiving inspection on the aircraft after its arrival.

The STA will then be returned late this month to Grumman Aerospace Corp. for installation of an electric aileron trim system. This minor modification to the STA control system will take approximately 1 week.

The second STA, scheduled for delivery to NASA in late July, will remain at Bethpage for continuation of the flight test program to insure that the various landing flight modes of the orbiter can be duplicated by the STA.

The remaining flight tests will concentrate on verifying the STA's ability to match the Shuttle orbiter trajectory during the period from 35,000 feet through touchdown and verifying several recent engineering changes.

Trajectory matching is accomplished by using thrust reverser engines and direct lift control to vary the Gulfstream II aerodynamics to provide flight characteristics similar to the Shuttle orbiter.

Welfare club

Ames Employees Welfare Club was established to allow fellow Ames employees to assist the beneficiary of a deceased member, at a time when it is most needed. The Club, as an initial action will present a check in the dollar amount equal to the number of members at that time to the beneficiary. The Club presently has 560 active members.

It is apparent by the number of active members, that many Federal employees are not signed up; and part of the reason is: they do not know the existence of such a club or its functions.

Dues are assessed at $1.00 per member, payable at the time of a death of a member, to replace the amount paid to the beneficiary. An extra dollar is assessed at the time of initial joining the Club in order to build up a reserve of funds for emergency use. If the Council determines that the reserve of funds is excessive, a grace collection would be called for at the next death of a member and no collection would be made.

The present Council Officers are: President, Bill Angwin, 213-10, 5119; Vice President, Joe Bilgri, 221-5, 5680; Secretary, Fred Tucker, 221-6, 5138; Treasurer, Mary Brown, 221-6, 5139; Member, Frank Cleary, 221-5, 5674; Member, Joe Auby, 218-1, 5211.

Each member serves for 2 years and 3 new members are elected each year, replacing those departing.

To join the Ames Employees Welfare Club, or for further information, please contact any of the above members.

Election of new members will take place later this year, please submit your name, if you are interested.

"The Viking search for life" -see page 2

Jetsetter news

2–7 July – BICENTENNIAL (Boston, New York, Philadelphia, Washington, D.C.)

20 August (Friday) – WINE & DINE CRUISE. Sip a delightful glass of champagne and dance from fabulous Fisherman's Wharf to historic Jack London Square where you will dine at your choice of two exciting restaurants. You will be sailing under the San Francisco Bay Bridge and up the world famous Oakland Estuary by moonlight. Cost – $21 per person. Cost includes: Motorcoach transportation from Moffett Field and return (departs 5:30 p.m., returns 1:30 a.m.), Bay Cruise, Dinner, Complimentary Wine on return trip, and a California Host escort on board. Cost also includes restaurant tax and tip – you may tip the bus driver and California Host if you desire to do so. RESERVATIONS DEADLINE – 13 August 1976.

Restaurant choice and menu:

BOW & BELL – Your seat is on the 50-yard line as you watch the huge ocean-going ships on the fabulous Estuary. Your cruise dinner features a mixed green salad, potatoes au gratin, rolls, butter, beverage and entre: Special Sirloin Dinner Steak, or Pan Broiled Mahi Mahi, or Grilled Sea Bass.

SEA WOLF – Dinner in a historical and nautical setting. Dinner features crisp green garden salad with seafood, potatoes du jour, French bread, butter, fresh vegetables, beverage and entre: Petite Sirloin Steak, or Veal Cutlets, or Baked Seafood Newburg.

CHECK YOUR BULLETIN BOARDS FOR THIS NOTICE (Sorry, the dinner cruise is only offered on Friday nights.) CONTACT MARIAN DAVIS, Ext. 5832/3, M/S 206-3.

The trip scheduled for Vienna, Austria on 11 September, as announced in the last issue of the Astrogram and flyers which were distributed to all personnel a few months ago, *has been cancelled.* This was because of two increases in the cost of the trip as offered by the travel agency.

'76 Stanford NASA-ASEE Seminars

The partial schedule for the 1976 summer Stanford NASA–ASEE Aerospace Technology seminar is as follows:

July 7 "Magnetohydrodynamic Energy Co sion – What Is It and Can It Help ? In the Near Future?"
Speaker – Charles H. Kruger

July 14 "Solar Activity and Terrestrial Weather"
Speaker – John M. Wilcox

July 21 "Who Invented the Airplane"
Speaker – Nicholas J. Hoff

The remaining topics will be printed in the next issue.

This seminar wil be at 8 p.m. in the Skilling Building, Room 080 (Auditorium) and is open to the public. The seminar (AA2985) is also available to registered Stanford students for one unit of credit (call 497-3079).

"The Viking search for life"

(Continued from last issue)

However they acquire their energy, all Earth organisms exchange chemical materials with their environment. The photosynthetic plants, for example, consume carbon dioxide and water from the environment and use the carbon, oxygen and hydrogen to build up larger energy-rich molecules. They emit oxygen gas as a waste product. Oxygen users release carbon dioxide as they break down energy-rich food.

The Viking biology experiments can detect these kinds of chemical changes produced by living organisms on Mars. Chemical signs then, rather than visual signs, will tell us if our neighboring planet supports life.

Pyrolytic Release Experiment

Since the Martian atmosphere is rich in carbon dioxide and also contains trace amounts of carbon monoxide, Martian organisms might be able to convert the carbon in these gases into organic matter. They might also use Martian sunlight to power this process of assimilation.

One of the biology experiments, known as the Pyrolytic Release experiment, incubates a 0.25 cc sample of Martian soil in a small chamber and exposes the soil to simulated Martian sunlight and a Martian atmosphere with radioactively labeled carbon dioxide and carbon monoxide added. If soil organisms exist that can assimilate carbon from these compounds, then they will assimilate the radioactive carbon in the chamber atmosphere. Principal investigator for this experiment is Professor Norman Horowitz of the California Institute of Technology.

After five days of incubation the sample is heated, or pyrolyzed, at 625°C. This breaks down any organic material that soil organisms have produced during incubation. The pyrolyzed material is driven out of the chamber and into the Organic Vapor Trap (OVT) where the larger organic fragments are trapped.

Then the OVT itself is heated to 650°C to release the organic fragments. In this process, the organic fragments are converted to carbon dioxide which is flushed into a radioactive detector.

This gas should contain radioactively labeled carbon if organisms assimilated carbon dioxide during incubation.

As with the other biology experiments, if results suggest that life is present, a "control" experiment will be run. This is identical to the original experiment except that the soil sample is heated to 160°C for three hours before the experiment begins to ensure that any soil organisms are killed. Only if the experiment with this heat-sterilized soil proves negative can the positive results from the original experiment be interpreted as evidence of life on Mars.

Labeled Release Experiment

A second experiment, the Labeled Release analysis, also uses radioactively labeled carbon to test for the signs of life. But this experiment is designed to detect, not assimilation of carbon, but release of carbon dioxide as soil organisms metabolize food. Dr. Gilbert Levin of Biospherics Incorporated in Rockville, Maryland is the principal investigator of this package.

A 0.5 cc soil sample is sealed in a test cell containing Martian atmosphere. A few drops of radioactively labeled nutrients in a water solution moisten the soil and an 11-day incubation begins. The atmosphere above the sample is continuously analyzed for radioactive gases. Presence of these gases will indicate that soil organisms have broken down the radioactive carbon compounds in the nutrients and released some gases as waste products.

Gas Exchange Experiment

The Gas Exchange experiment measures the production or uptake of simple gases like carbon dioxide, nitrogen, methane, hydrogen and oxygen in a Martian soil sample which is either exposed to water vapor or partially submerged in a solution of amino acids, vitamins, other organic compounds and inorganic salts. Vance Oyama of the Life Detection Systems Branch at Ames is the principal investigator of this third and final experiment. Other team members include Professor Joshua Lederberg of Stanford University and Professor Alex Rich of MIT.

Only carbon dioxide and two inert gases compose the atmosphere above the soil sample as incubation begins.

The soil sample is held in an inner cup within the incubration cell. During the first stage of the experiment, 0.5 cc of nutrient solution is added to the bottom of the cell; the solution doesn't come in direct contact with the soil.

After seven days in this "humid mode" an additional two cc of nutrient solution can be added – enough to partially submerge the soil in the complex nutrient medium.

The disappearance or release of certain gases in the chamber will reflect growth and metabolism or organisms in the Martian soil sample. A gas chromatograph will measure gas composition in the chamber every few days. By plotting results, analysis by analysis, changes in gas composition will be determined.

The Experiments Compared

The three biology experiments represent three different approaches to the search for life. The Pyrolytic Release experiment detects organisms can use the carbon dioxide and carbon mo present on Mars to build the complex mole they need to survive. This experiment also detects photosynthesis, the ability to tap the energy from Martian sunlight to build these molecules.

The Labeled Release and the Gas Exchange experiments search for organisms that can only obtain their energy by metabolizing nutrients. The Labeled Release experiment is designed to measure the carbon dioxide released during this metabolism while the Gas Exchange experiment detects the production or release of a number of gases including carbon dioxide.

The Pyrolytic Release experiment most closely simulates average Martian conditions. Either little or no water vapor is provided and no nutrients are added to the Martian soil. A small amount of radioactively labeled carbon dioxide/carbon monoxide gas is vented into the Martian atmosphere of the test cell. The simulated Martian sunlight source filters out the ultraviolet radiation normally hitting the surface of Mars.

The Gas Exchange experiment offers the most Earth-like conditions, providing a solution of over 50 organic and inorganic compounds which many Earth microorganisms need to survive. Mars organisms, if they exist, may or may not thrive on these nutrients. The nutrient solution only partially submerges the soil, so soil organisms requiring a drier environment can survive.

The Labeled Release experiment provides the soil sample with only a few drops of a nutrient solution containing radioactively labeled compounds. The nutrients are very simple organic compound might today be formed on Mars by the a solar ultraviolet light on the Martian atmosphe

The Pyrolytic Release and Labeled Release experiments search only for carbon-based life – like life on Earth. The Gas Exchange experiment can detect changes in non-carbon gases and thus may be able to indicate the presence of organisms which have non-carbon based chemistry.

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The Astrogram

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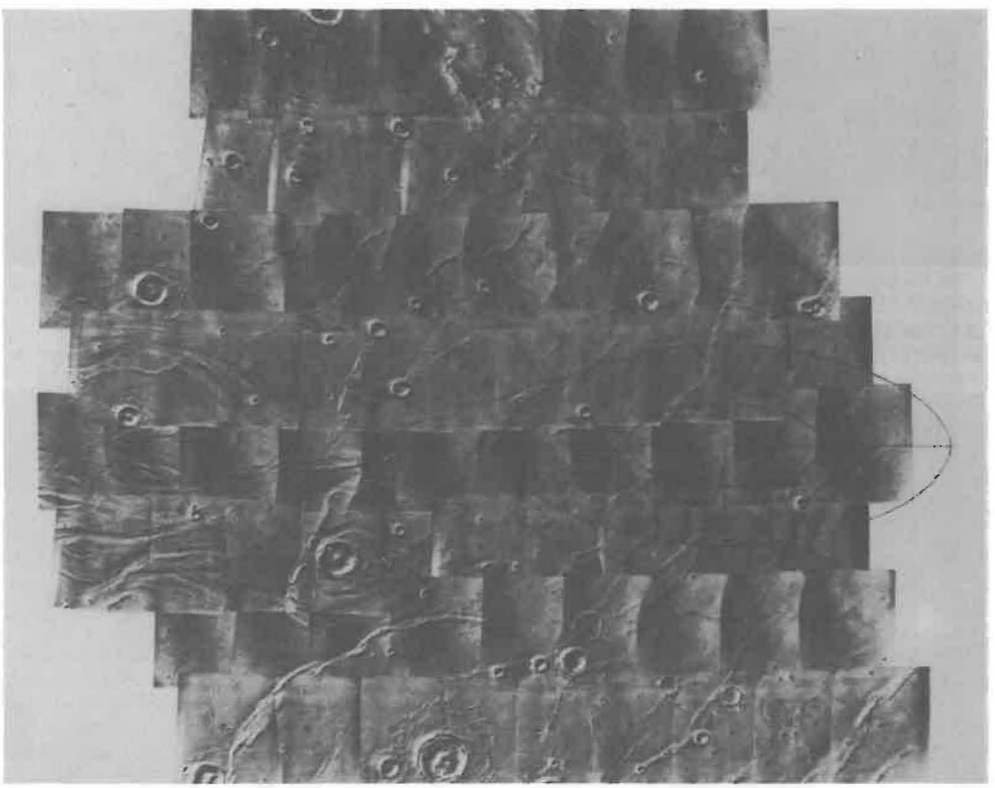
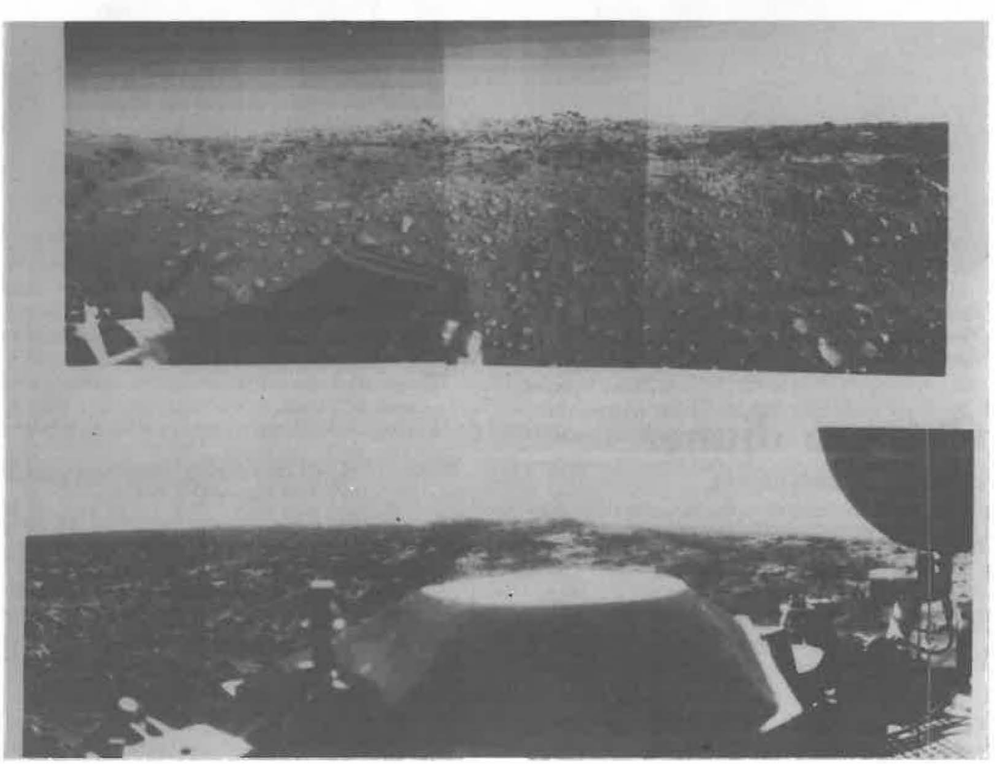
Successful landing on Mars for Viking 1



Upper left

Viking 1 landed in one of the lowest regions on the surface of Mars. Center of the landing ellipse inscribed on this photomosaic of frames is located at 22.4° N. Lat., 47.5° W. Long., in Chryse Planitia. The new location is about 740 kilometers (460 miles) northwest of the original July 4 landing site and 240 kilometers (150 miles) west of an alternate site where the spacecraft was to touch down on July 17. This area is nearly three kilometers (two miles) below Mars' mean "sea level." It is a channelled lowland northeast of the great Martian volcanoes and the Tharsis Plateau, the high altitude equatorial region.



Lower left

First panoramic view by Viking 1 from the surface of Mars. (Top): The out-of-focus spacecraft component toward left center is the housing for the Viking sample arm, which is not yet deployed. Parallel lines in the sky are an artifact and are not real features. However, the change of brightness from horizon towards zenith and towards the right (west) is accurately reflected in this picture, taken in late Martian afternoon. At the horizon to the left is a plateau-like prominence much brighter than the foreground material between the rocks. The horizon features are approximately three kilometers (1.8 miles) away. At left is a collection of fine-grained material reminiscent of sand dunes. The dark sinuous markings in left foreground are of unknown origin. Some unidentified shapes can be perceived on the hilly eminence at the horizon towards the right. Patches of bright sand can be discerned among the rocks and boulders in middle distance. In right foreground are two peculiarly shaped rocks which may possibly be ventifacts produced by wind abrasion on Mars. A horizontal cloud stratum can be made out halfway from the horizon to the top of the picture. (Bottom): At left is seen the low gain antenna for receipt of commands from the Earth. The projections on or near the horizon may represent the rims distant impact craters. In right foreground are color charts for Lander camera calibration, a mirror for the Viking magnetic properties experiment and part of a grid on the top of the Lander body. At upper right is the high-gain dish antenna for direct communication between landed spacecraft and Earth. Toward the right edge is an array of smooth fine-grained material which shows some hint of ripple structure and may be the beginning of a large dune field off to the right of the picture, which joins with dunes seen at the top left in this 300° panoramic view. Some of the rocks appear to be undercut on one side and partially buried by drifting sand on the other.

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The Astrogram

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Viking: Research and results at Ames

Bonnie Berdahl and Marjorie Lehwalt, research scientists in Ames' Planetary Explorations Office, have put in a very busy summer in support of the Viking Mission.

Bonnie has been working at JPL processing flight data plus overseeing the lab version of the Gas Exchange Experiment, the Test Standards Module. It is almost an exact duplicate of the GEX package on the lander. All parts meet flight criteria – only the external "plumbing" systems are added.

Bonnie finds it very exciting to see some of the results of an effort that began for her in 1969 when she began working on the formulation of the nutrient or "chicken soup" that incubates with the Martian soil in the GEX experiment. This involved very complex testing of world-wide soils – from as far away as Antarctica – and even extra-terrestrial soil samples – a lunar sample underwent tests as well – in order to build a data bank with which to compare Mars data.

The Test Standards Module can handle only one sample at a time so most of this soils research is done in the lab using glassware. Marjorie Lehwalt runs duplication chemical studies with soil mockups. Selected soils that resemble Martian soil are subjected to high heat under vacuum to get rid of Earth contamination, are treated chemically or physically, exposed to Martian gas atmosphere and temperatures, then go through the same sequence of testing as the Martian soil undergoes in the Lander. The results are compared to see if the same gas exchanges are occurring.

Marjorie is a Microbiologist and has been at Ames for thirteen years. Bonnie Berdahl, a chemist, has eleven years service at Ames. They are both familiar faces to those inquiring minds at Ames who regularly stop by the bulletin board in Room 42 to check for interesting developments in the posted test results.

Career Development Program

NASA, as part of its management development plan, annually participates in selected fellowship programs sponsored by leading universities, colleges, foundations, the U.S. Civil Service Commission, and the National Space Club.

Programs selected are for NASA personnel with a strong potential for executive assignment.

In early October, Ames management will be reviewing candidates for the following programs:

Stanford and MIT – Sloan Fellowships, Dryden Memorial Fellowship, Education for Public Management, Harvard PMD (Programs for Management Development), Maxwell Midcareer Development (Syracuse Univ), Woodrow Wilson (Princeton), Congressional Operations Fellowship, Industrial College of the Armed Forces, Stanford Advanced Management College, and Santa Clara University Management Development Program. The grade levels for these programs range from GS-11 through GS-16.

Other development programs, announced earlier in the year, are the Harvard AMP (Advanced Management Program), Federal Executive Institute, Executive Seminar Institute, Brookings Institution Conferences, and the NASA Career Development Program (CDP).

Persons interested in being considered for any of the named programs may contact John Leveen or Meredith Moore, ext. 5623/5624, by Friday, Oct. 15. The details of each program will be outlined at meetings to be held in October.

Spanish Heritage Week

The members of the Spanish Speaking Advisory Week report that the Ames Hispanic Heritage Week, September 20-24, was a resounding success. Dr. Hans Mark's opening remarks, Dr. Phillip B. Welch's multi-media presentation, Dr. Matt Meier's talk on the Historical Perspective of the Hispanic, and Alfonso Ludi's presentation on NASA's Spanish Speaking Program comprised a most enlightening opening session on Monday.

The film series on Wednesday, the Art Exhibit which was displayed in the Library all week, and the Mexican food featured in the Cafeteria all week added immensely to the Theme of the week's celebration – A Sharing of Cultures.

The week's activities were concluded with a most enjoyable Happy Hour which featured Mexican Folk Dancers, Mariachi Music (played by one of the area's leading Mariachi Bands – El Mariachi Nuevo Aztlan), and delicious Mexican Hors D'oeuvres.

The Spanish Speaking Advisory Group thanks all of you who supported the activities thus making the Hispanic Heritage Week a success.

Gov't driver's licenses

Federal regulations require that all personnel operating Government-owned motor vehicles must have a U.S. Government Motor Vehicle Operator's Identification Card (Government Driver's License) in their possession while operating the Government vehicle. This applies to both Civil Service and Contractor employees at Ames operating Government cars, trucks, forklifts, etc.

Effective October 4, 1976, the Security Branch will assume responsibility for issuing Government Driver's Licenses. The location for obtaining the necessary forms will be changed from the receptionist in Building N-218 to the Badge and Decal Office, Building N-241, Room 119. Forms and instructions may be picked up any business day between 8:00 AM and 3:30 PM. Personnel applying for the Government Driver's License must possess a valid state driver's license. Instructions for completing these forms are attached to the application.

Annual awards ceremony

The Ames Annual Awards Ceremony will be held Tuesday, October 26, at 2:30 p.m. in the auditorium. All Ames retirees are invited.

The ceremony will honor those who have completed 20, 25, 30, 35, and 40 years of service with Federal Government.

Dental notice

The Dental enrollment period will terminate on October 15. The next enrollment service will be in the spring.

The representative will be at Ames in Building 241, room 147 from 12-1 p.m. on October 15 to answer questions and pick up final enrollment cards.

Viking tests Einstein's theory

Scientists are using the Viking spacecraft on Mars test Einstein's theory of general relativity. The experiment may be 10 times more accurate than any previous tests of the theory.

Both pairs of Viking Orbiters and Landers will be used in the test, which involves the measurement of roundtrip travel time of radio signals between Earth and the spacecraft. General relativity predicts that these signals will be slowed as they pass the Sun.

The tests are being conducted as Mars passes directly behind the Sun, as seen from Earth. Radio signals take 42 minutes to travel from Earth to the spacecraft and back. The predicted relativistic slowdown of the signals will have reached a maximum on November 25, causing an increase in the travel time of about two/ten-thousandths of a second.

Because of the precise Viking radio communications system, the 42-minute roundtrips of signals can be timed with an error of only one/ten-millionth of a second.

Einstein's theory of general relativity is the fundamental theory of gravitation, one of the known four basic forces in nature. Although it is the weakest force, gravitation governs all large-scale motions of matter and radiation in the universe, and bears on the question: Will the universe continue to expand forever, or will it eventually reach a maximum size and collapse?

Gravitation is also a key element in understanding the formation and evolution of such diverse astrophysical objects as galaxies, black holes and neutron stars.

Despite its importance to astrophysics, general relativity has been subjected to the fewest tests of any fundamental theory. Laboratory experiments cannot accurately measure effects predicted by general relativity; experiments must encompass the solar system. The four Viking spacecraft are well suited to this test, both because they enable roundtrip delays to be measured with great accuracy and because they can be used to determine other contributions to delays well enough to separate the relativistic contribution. Other contributions stem from two sources: the orbits of Earth and Mars, and the Sun's corona, through which radio signals must pass.

A special Viking Project group, headed by W. F. Cuddihy of NASA's Langley Research Center, which manages Viking, is coordinating all planning activities for the experiment.

Viking biology lab

Bonnie Dalton

John Calamoris

Bonnie Dalton of Ames Research Center leads a busy life giving Viking presentations to groups ranging from the Soroptimists to the Kiwanis. Manager of the Biosystems Viking Biology Laboratory in Bldg. 236 since Jan. 1974, she is in charge of the experiments run on two of the Test Standard Modules used to design the biology package for Mars. Testing soils specially incubated under a strong drying agent and loading them in the Pyrolytic Release Module enables the Biology Lab to mimic conditions found on Mars. Most of the operations of the PR instrument have been performed primarily to test variability of the unit's organic traps.

Among tests run on the Labeled Release unit were experiments to determine the levels of evacuation which might be run on a soil sample to prevent soil blowing, and tests of lunar soil. Currently, tests of peroxidated soils are being compared with the Martian results.

Although Ms. Dalton is by training a Microbiologist, her assistant, Bill Ashley, a Histopathologist, and John Calamoris, a Biochemist, all three feel like qualified mechanical engineers after two years of manipulating valves, wires and connectors. Tracing down a gas leak in the test modules means looking for a lead of 10^{-7} cc per minute. Much credit goes to Bill Chung and Dwight Moody, skilled in working with microminiature parts.

As the Biosystem Lab's role in the Viking Mission begins to wind down this spring, the team will begin to gear up for the Space Lab experiments it is in the process of designing. This time the biology will involve life forms ranging from fruit flies to monkeys being tested for reaction to space flight.

Smoke detectors safe

The National Fire Prevention & Control Administration and the National Bureau of Standards support the Nuclear Regulatory Commission's determination that radiation from ionization smoke detectors represents a negligible exposure level.

"Instances have been brought to our attention where people either did not purchase a smoke detector or removed in-place detectors from their homes out of fear of radiation," said Howard D. Tipton, NFPCA Administrator. "While the risk of radiation from a smoke detector is negligible, the risks of failing to purchase a detector, or of removing one already installed, are very real. Of the 12,000 persons who die from smoke and fire each year, and of the 300,000 persons who are seriously injured, the great majority fall victims at home at night. Smoke overcomes them before they can awaken and escape. Where people are not protected by smoke detectors, the likelihood of fire-deaths and injuries is increased."

Foothill students receive phase

The above Foothill/DeAnza students recently received Phase Certificates from Lee Stollar, Chief of Technical Services Division, for completing specific phase work in the Machine Tool Technology Program at Ames Research Center. They and their job sites are (l. to r.): Fabrication Shop-Mike Guerreiro, Sam Borland, Tom Gibertson, Tim Hickey. Wood Model Shop- Steve Hays. Machine Shop- Ron Lamica, Don Rodovich, Robert Stahl.

Lee and McCroskey honored

Prof. Erastus H. Lee of Stanford University and William J. McCroskey, an engineer at the Ames Research Center in Mountain View, have received medals from the American Society of Mechanical Engineers.

Lee received the Timoshenko Medal for his contributions in solid mechanics over a 30-year period. The award was named for Prof. S. P. Timoshenko of Stanford, under whom Lee studied.

Lee was born in Britain, and he headed a solid mechanics division of the British armaments research department during World War II. After the war he was assistant director of the British atomic energy department. In 1948 he joined the Brown University faculty, and in 1962 he became a Stanford professor.

McCroskey received the Freeman Scholar Award. He delivered a speech on current research on aerodynamics at the society's annual meeting.

McCroskey received a Ph.D. aeronautical and mechanical engineering in 1966, and he joined the U.S. Army Aeronautical Research Laboratory. He now heads the fluid mechanics group of the Army Air Mobility Research and Development Laboratory at Ames. Helicopters are a specialty.