



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

Ames Heat Pipe Experiment doing fine

Equipment in homes, hospitals industrial plants and laboratories may soon be heated and cooled by a device which uses no electrical power and no moving parts.

Such a device is being tested aboard the Orbiting Astronomical Observatory (OAO-C), launched by NASA Aug. 21, 1972. Called the Ames Heat Pipe Experiment (AHPE) the device is controlling the temperature of an electronic computer aboard the observatory.

According to J.P. Kirkpatrick, Ames Research Engineer and Principal Investigator, "the first six months of operation have been in accordance with ground tests and established theory."

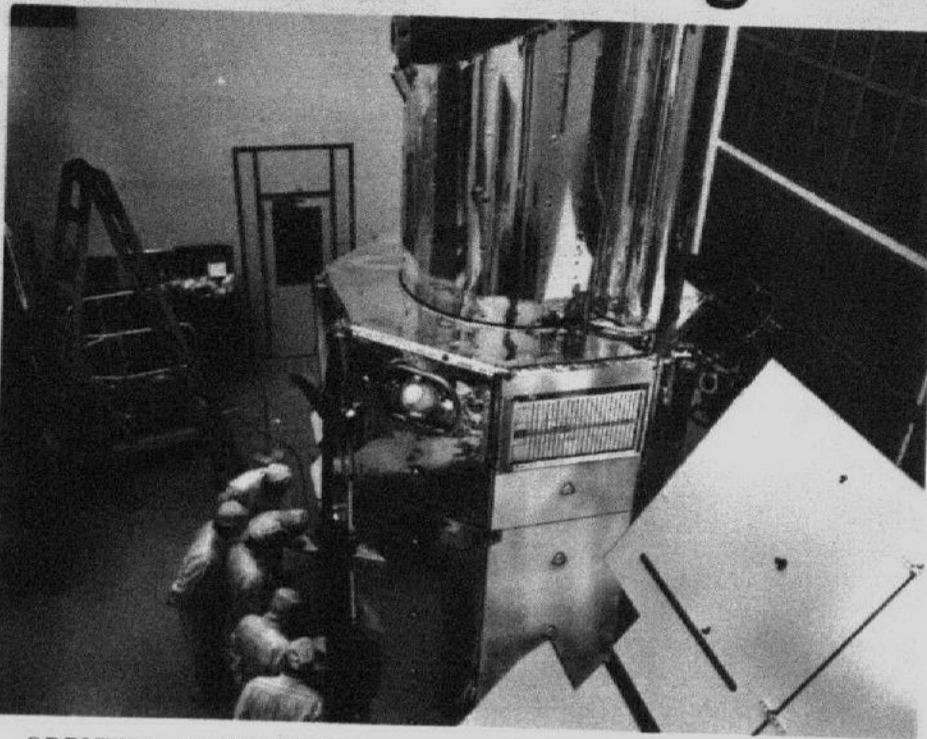
A significant improvement over previous methods of thermal control, the AHPE uses no electrical power and no moving parts. Yet it maintains a temperature of 60 to 70 degrees fahrenheit, when conventional methods of thermal control in the same circumstances would allow a variance of 0 to 140 degrees fahrenheit.

It does this by transporting thermal energy by means of a continuous evaporation-condensation cycle. On the OAO the dissipated thermal energy from the computer is conducted into a pipe where it evaporates methonal working fluid.

A self-induced pressure gradient drives the vapor to the cooler end of the pipe where it condenses and releases its latent heat of vaporization which passes through the condenser wall to be rejected by the radiator. The condensate returns to the evaporator by capillary pumping through a sintered metallic screen wick.

Helium gas, which will not condense at these operating temperatures is stored in a reservoir held at a near-constant temperature by the vapor in the evaporator. The helium gas is allowed to enter the condenser where it forms an interface with the working fluid, which tends to sweep it back into the reservoir.

As the heat load increases the vapor temperature tends to rise with a corresponding increase in vapor pressure. The increasing pressure compresses the control gas exposing additional condenser heat transfer area which results in greater heat removal. This in-



ORBITING ASTRONOMICAL OBSERVATORY. . . is prepared for launch in the clean room at Kennedy Space Center just prior to launch Aug. 21, 1972. The Ames Heat Pipe Experiment (AHPE) may be seen as the rectangular, lined surface on the right side of the observatory.

creased heat transfer maintains the electronics temperature nearly constant.

The device was designed to determine the performance and reliability of a gas controlled heat pipe in the zero-g environment of space and to demonstrate in a specific engineering application the effectiveness of a variable conductance heat pipe in providing temperature stability for spacecraft equipment experiencing varying electronic duty cycles and/or changing thermal boundary conditions.

Confidence established by the AHPE has already led to the use of gas-controlled heat pipes on two other major spacecraft.

According to Kirkpatrick, the theory behind the heat pipe was first postulated around 1940. However, it was not until 1964 that the potential of the heat pipe was realized. Since that time, heat pipe technology has advanced rapidly.

Much work has been done to advance heat pipe hydrodynamics, heat transfer, materials compatibility and fabrication technology. However one of the more recent and potentially important areas is the development of variable conductance techniques. Ames, a recognized leader in this field, has developed techniques for varying pipe

conductance.

TRW Systems, Inc. developed the flight hardware for the experiment, under the direction of Dr. B.D. Marcus. The AHPE is also pioneering the way for an experiment on ATS-F to flight test a feedback controlled variable conductance heat pipe, developed for Ames by the Dynatherm Corporation and a heat pipe thermal diode, developed by Grumman Aerospace Corporation. Both these contracts are technically managed by Kirkpatrick.

April 1 deadline for accident insurance

Premium notices for Travel Accident insurance will be distributed next week. Participants should be aware that their current coverage expires April 30 and there is no grace period. To continue coverage for the insurance year beginning May 1, premiums must reach the Cashier's Office, Mail Stop 203-16 by close of business, Monday, April 30. No second notices will be sent.

NASA employees may enroll in the Travel Accident plan at any time. Information concerning amount of coverage and premium charges may be obtained from the Training Office, Mail Stop 241-3.

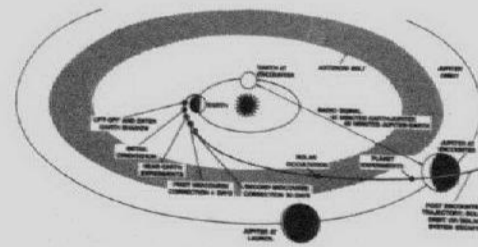
Pioneer 11 is on its way

Ames' Pioneer 11 spacecraft was successfully launched from Cape Kennedy, Fla., Thursday, April 5 at 6:11 p.m., PST.

It is now traveling on its 620-million-mile flight path to Jupiter at 20,000 miles per hour. Monday, April 9, it was already 1.85 million miles from Earth.

The unmanned spacecraft will have five mission options - both at Jupiter and far beyond. These options will depend on results returned by Pioneer 11's predecessor Pioneer 10, now three-quarters of the way to Jupiter. Pioneer 10 will make the first reconnaissance of the giant planet during the period between Dec. 1 and 6, 1973.

If Pioneer 10 is unsuccessful, Pioneer 11 will repeat its mission. Otherwise, Pioneer 11 may fly a different course over the planet's surface, making measurements and taking pictures that will complement those of Pioneer 10. The spacecraft may also investigate another of Jupiter's planet-sized moons. After flyby, it may follow Pioneer 10 and become the second man-made object to escape the solar system, or mission directors may choose a solar orbit near Jupiter's orbit. One possible trajectory could take it to Saturn in 1980.



PIONEER 11'S FLIGHT PATH

Spacecraft controllers can accomplish the various options open to Pioneer 11 by varying the spacecraft's swing-by trajectory around Jupiter -- using the planet's gravity and orbital motion to change spacecraft speed and direction.

The trip to Jupiter will take 609 days, with an arrival date around Dec. 5, 1974.

David Reese receives Federal award

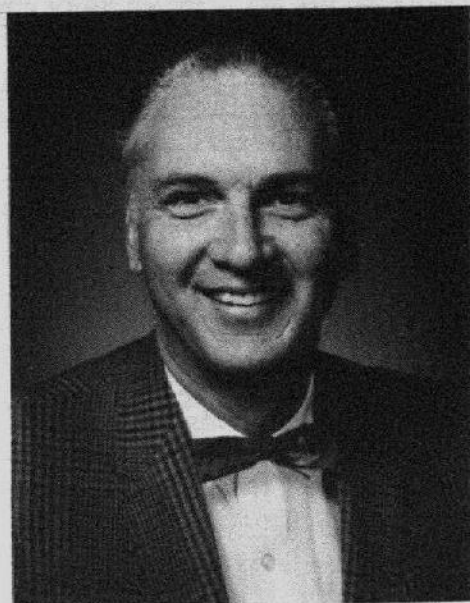
David E. Reese, Jr., Project Manager, Quiet Short Take Off and Landing Aircraft, received special recognition for his voluntary service to the community by the Federal Executive Board's Service to the Community Committee recently.

He was selected for the honor, which includes a certificate and publication of a small brochure containing his photograph and a brief description of his community service.

Reese was recommended for work that, "started in the early 1960's when Mr. Reese was appointed to serve as chairman of the Center's annual campaign in support of the United Fund agencies in Santa Clara County. This became the spring-board for his involvement in the Mountain View Chapter of the Santa Clara County Allocations and Admission Committee of the United Fund organization. He had served two years as a member and four years as chairman of the local Committee when he was asked to join the Santa Clara County Allocations and Admission Committee, an assignment he accepted willingly for three years.

"While working with the United Fund organization Mr. Reese discovered that he and a group of fellow research engineers and scientists at Ames had a common interest - they wanted to put their technical training to work solving human problems. Called "Scientists and Engineers for Social Action" the group set out to identify socio-economic problems to tackle. "We found them, too," said Mr. Reese. "It wasn't long before the plight of some 800 families in San Jose, displaced because of urban renewal, came to our attention. Adequate housing was nonexistent and construction money was even scarcer."

The group formed a citizens committee headed by Mr. Reese. Their aim was to seek support for the establishment of a Housing Authority in San Jose to underwrite construction of low-cost housing. Speaking before civic, labor, and church groups throughout the area



they were able to convince the San Jose City Council of the need, and the Housing Authority became a reality. But this was only the beginning. The group was soon approached by the Santa Clara County Planning Office to help establish a county-wide Housing Authority. Once again Mr. Reese and his team set out on the "talk circuit." When they finished, the County of Santa Clara also established a much-needed Housing Authority.

At present Mr. Reese is working two church groups in Palo Alto who have formed an organization called Community Housing, Inc. Their aim is to provide better low-cost housing for the elderly citizens whose fixed incomes are not adequate for the rising cost of rents, increased taxes, and everyday living expenses. This affluent community has a larger number of older people who need help than any other city in the Bay Area. According to Mr. Reese life is tough for these elderly people. In the past 18 months a proposal has been developed to build an apartment house complex of 220 units; land in the downtown area of Palo Alto has been approved by the City; and at this point in time the entire package is under review by the Department of Housing and Urban Development.

It's good to know people care and do something about it."



John C. Delaney, (left) Assistant Chief, Procurement Division, smiles approvingly as he presents awards to Joseph M. Camp (middle) Supervisory Contract Specialist, and Joseph E. Rokovich, (right) Procurement Agent.

Camp received a \$350 honorarium and NASA Special Achievement Award for the development of the "Equal Employment Opportunity Contract Compliance program at Ames and Flight Research Center. His efforts resulted in the hiring of minority employees at a "considerably higher ratio than the percentage of local community minority population at both Ames and FRC." Under his guidance, "50 contracts and supplements totalling over one million dollars" were awarded to small minority businesses. He also developed an "outstanding training program" at De Anza College for procurement personnel.

Rokovich received an Employee Suggestion Award and a check for \$290. He was recognized for his invention of a time-saving form used by the Procurement Division. The form will reduce the amount of time required to obtain price quotations from companies.



ERNEST E. PORTER, RSC, . . . (center) receives a check for \$250 and a NASA Special Achievement Award from Model Development Branch Chief, Kenneth Caillat (left) and Shop Foreman, Lester W. Buettner (right). Porter was recognized for his, "technical skills determination, awareness, and uncommon ability to solve insurmountable problems."

According to his award recommendation, "Mr. Porter is an unequivocally successful modelmaker, each day working with sense of urgency and dedication to the project."

Award to Astrogram

"The Astrogram" was awarded "Best Newsletter Award" for its coverage of the 1972 Combined Federal Campaign recently. The award is given annually by the Santa Clara United Fund.

ASTROGRAM Admin. Mgt. Building
Phone 965-5422

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Editor Jeanne Richardson
Reporters NASA Employees

Deadline for contributions:
Thursday between publication dates



NASA GROUP ACHIEVEMENT AWARD . . . was presented to the Travel Voucher Function employees for "reducing the backlog of unpaid travel claims created by the complete turnover in personnel in 1971." Ralph F. Shawlee (left), Chief of the Financial Management Division, presents the awards and \$100 each to (l to r) Betty M. Coulter, Patricia E. Hallet, Patricia L. Uribe, Lester L. Montgomery. (Not pictured is Ronene M. Miller.)

The group's efforts have made life easier for many Ames employees. According to their award recommendation; "Though lacking experience and training the employees mounted a drive to be working up to date. Reaching their goal and continuing with the same effort has improved reporting of the actual cost per trip as reported in the weekly organizational travel reports. It has reduced the travelers waiting period for reimbursement from 4 to 12 weeks to approximately 1 week and in some instances less."



INNOVATORS . . . Patent awards were given to six Ames employees by Ames Director, Hans Mark (left), March 20 in the Director's Committee Room. Recipients and their inventions are (l to r); Thomas N. Canning, PDS, "Bimetallic Fluid Displacement Apparatus;" Thomas B. Fryer, RFD, "Low Power Electromagnetic Flowmeter Providing Accurate Zero Set;" Kenneth W. Billman, STG, "Infrared Tunable Laser;" Dennis S. Matsuhira, RFE, "Shoulder Harness and Lap Belt Restraint System;" Albert P. Garavaglia, RFE, "Shoulder Harness and Lap Belt Restraint System."

Ames leads NASA centers in Tech Briefs

Ames led all NASA centers for Tech Brief publications 1972 publication results showed. With 184 briefs, Ames claimed 24 percent of the NASA total.

NASA reached an all-time high with 756 briefs published. Requests for backup, or Technical Support Packages, of the Ames briefs has also gained significantly, with 1296 requests in January, 636 in February, and 740 in March. These vary from small and large business and industrial firms to medical institutions, universities, cities, states, other governmental agencies, and foreign country sources.



TECH BRIEF AWARDS . . . are public announcements of new technology derived from the U.S. Space Program. Twenty-two such awards were presented to Ames and contractor employees March 12 in the Director's Committee Room. Dale L. Compton (first row, left), Technical Assistant to the Director, made the presentations.

The recipients and their technology are (bottom row, l to r); E. Vernon Ballou, San Jose State University contract employee, "Stabilization of Porous Glass Reverse-Osmosis Membranes;" Mark I. Leban, LTC, "Stabilization of Porous Glass Reverse-Osmosis Membranes" and "Purification of Contaminated Water by Filtration Through Porous Glass;" Robert W. Rosser, SC, Polyimide Foams Provide Thermal Insulation and Fire Protection;" Robert L. Corbett, LTN, "Silver Stain for Electron Microscopy;" Richard M. Brown, RFD, "Redirecting Electro-Magnetic Beams through Wide Angles;" (second row) Da Yu Cheng, contract employee with University of Santa Clara, "Control of Oscillations in a Discharge Circuit;" William I. Linlor, SS, "Remote Measurement of the Water Content of Snowpacks;" John R. Hallahan, LTC, "Rapid Evaluation of Reverse-Osmosis Membranes;" Theodore Wydeven, Jr., LTC, "Purification of Contaminated Water by Filtration through Porous Glass," and "Stabilization of Porous Glass Reverse-Osmosis Membranes;" Masayuki Omura, FSV, "Redirecting Electromagnetic Beams through Wide Angles;" William D. Gunter, Jr., RFD, "Optical Enhancement of Sensitivity in Laser Doppler Velocity Systems;" (third row) Spencer A. Shaw, retired, "Optical Enhancement of Sensitivity in Laser Doppler Velocity Systems;" George R. Grant, RFD, "Optical Enhancement of Sensitivity in Laser Doppler Velocity Systems;" John E. Humbert, RKP, "Real-Time Pair-Feeding of Animals;" Jack M. Pope, FSV, "Protective Encapsulation of Implantable Biotelemetry Units."

Award recipients not pictured and their technology are; Henry A. Leon, LRP, James P. Connolly, RFS, and Maurice J. Hitchman, RFD, "Real-Time Pair-Feeding of Animals;" Alfred C. Masey, MA, "Rapid Analysis of Electric Propulsion Missions;" Nigel C. Tombs, retired, "Protective Encapsulation of Implantable Biotelemetry Units;" John Dimeff, R, Redirecting Electromagnetic Beams through Wide Angles;" and "A Simple Tachometer Circuit."

"Ames Airings"

The best story to come from the administration building in recent months is the one about Hans Mark, Director, and C.A. (Sy) Syvertson, Deputy Director. One evening, not long ago, they finished up the day about the same time, and were driving out the main gate together (Sy behind Hans). The guards halted traffic, so Hans and Sy stopped. Sy looked out his side window and began daydreaming. Absentmindedly his foot left the brake peddle and slipped onto the gas.

This, of course, made his car move -- into the back of Hans' car. There was only minimal damage to the cars, but there have been rumors of a new office for Sy - somewhere behind building 245.

Does everyone understand the definition of a Freudian slip?

The following was recently received here; "Mr. Theodore W. Helweg, Vice President of Marketing, American Express Card Division, cordially invites 'Mr. Nasa Ames' to apply for the American Express Card."

Nice to know we have such good credit ratings. Could we put our trip to Jupiter on the American Express Card, dear? Oh, well then, how about your Illiac operation?

Thomas M. Carson, FSC, and the Flight Systems Research Division contributed to the March of Dimes March 11. The division sponsored Carson for the 20-mile walk, but with the stipulation that he run.

A member of Ames' Jogger-nauts, Carson ran the entire course, stopping only three times; twice for traffic lights and once to shed outer clothing. Although the division paid him \$60 to participate in the annual event to aid crippled children, none got up in the early hours to watch him perform.

"My wife was my cheerleader," says Carson. "She thought I'd have a heart attack, and she was a little worried about my sanity, so she stayed behind me in the car the whole time."

It took Carson only two and one half hours to run the pre-planned course from Santa Clara University's Buck Shaw Stadium, through Santa Clara and San Jose to Campbell.

A new baby arrived at the Deiwert home last week. She is the first for Vicki, (previously of AA) and George (STG). Her name is Sara Elizabeth, she's blonde, blue-eyed and weighs about 7 1/2 lbs. right now.

Harry Devoto, Chief of Graphics and Exhibits for the past nine years,

will retire tomorrow, April 13, from Ames. He came to the Center in 1947. When asked what he will do now, Harry says, "be retired." He said his parting thoughts are, "Management isn't losing a branch chief, they're gaining a parking space."

SOFTBALL

Last year ARC's Softball team won the runner-up championship and presented a second place trophy to Hans Mark. This year the team will be shooting for a championship if additional participants sign up for the team. Contractor personnel, guest workers and student workers are eligible to join the ARC-Fastpitch team. Interested parties are encouraged to join the team. If interested please contact John W. Yusken, ext. 5724 or Robert Randle, ext. 6024.

GOLF

After three rain outs, the Ames Golf Club finally played it's first tournament on March 31 at Pleasant Hill. The winners of two flights as reported by Chairmen Larry Hochstein and Clark White were:

First Flight: O. Koontz, 1st.; V. Oyama, 2nd; and A. Petretti, J. Neland and D. Banducci tied for 3rd.

Second Flight: H. Garrison, 1st. C. Eddy and J. Cayot tied for 2nd. and B. Gray, 3rd.

The next tournament will be at Pajaro in Watsonville on April 21. Sign up to play by contacting Mitch Radovich (ext. 5180) or Clark White (ext. 5438) by April 13.

Happenings

April 15 deadline for AIAA Asymmetric model airplane contest entry forms. Forms may be obtained from Mamoru Inouye, mail stop, 233-1. They must be sent to Mamoru Inouye AIAA, P.O. Box 1548, Mt. View, CA. 94040.

April 25 - AIAA luncheon and lecture on the L1011 Tristar by J. Ellison Hawkes, Director of Engineering, Lockheed. Meeting begins at noon in Chez Yvonne Restaurant, Mt. View. For reservations call Joan at ext. 6440.

April 17-18 - Environmental Pollution Symposium, sponsored by ACS, AIAA, AIChE, ASME, SAE, in the Ness Auditorium, Stanford Research Institute, 333 Ravenswood, Menlo Park. For information contact Ms. Shirley B. Rodding, SRI.

WANT ADS

ADVERTISING of articles or services in this publication is restricted to employees of Ames Research Center and on-site employees of support contractors. Articles or services advertised herein must be offered for sale or rental as advertised, without regard to race, color, religion, sex or national origin.

Advertiser must be identified by name, extension and organization. The name may be left out of the ad, but is needed for records. Ads must be submitted in writing to The Astrogram, N241-4, by Wednesday, a week before publication. The advertiser's home phone number must be used except in carpool notices. Ads must be limited to 15 words or less. Ads longer than 15 words will be cut down before printing.

TRANSPORTATION

FOR SALE

72 Vega station wagon, air/GT/ great cond., \$1800, 968-2752.

55 Thunderbird 312, auto. \$1650, 968-2752.

59 Triumph, gd. running cond., \$450 or best offer to a good home, 255-8507.

Yamaha RC5, 350, 72 like new, 10 mileage, extras, \$650, make offer, 961-1901 after 5 p.m.

71 custom deluxe Chevy w/ non overhead camper, AT, air, PB,PS R/H, asking \$3300/offer, 225-6550.

Mini-bike, 4 hp Tecumseh, like new, \$65, 241-3025.

71 Honda CT 90 trail bike, call 736-6810.

65 Chevelle, 6 cyl. std. trans., R/H low mileage, \$500, 241-3025.

Motorcycle-68 BMW R69S w/ faring \$975, call evenings 343-9730.

WANTED

Carpool, Milpitas to Berryessa area flexible schedule, call Ken Lennon, x 6165 or 5183.

German or Swedish car, good mech. cond., \$500-800. 379-0869.

HOUSING

FOR SALE

Westgate home, 5-bdrm, 2 1/2 ba. w/w carpet, dining or fam. rm. 220, AEK, fireplace, \$37590, 379-4389.

Foreign Mail

Ames employees sending parcels to foreign countries via the Mail Room must prepare the packages to meet postal regulations.

This means that the contents of the package must be stated and attached to parcel for customs declaration (for mailing restrictions to foreign countries, see ACM-15 1-6/1-7).

The size of the package may not exceed 72" in length and girth combined. It may not weigh over 44 lbs.

FOR RENT

May-November, large house, beautiful view, 20 min. from Ames. 345-2338.

MISCELLANEOUS

Olympia-50 electric typewriter, dual ribbon, used 5 mo. \$335, call Frank Thompson, 379-2385.

Puppies-3/4 Lab, 1/4 Golden Retriever, born 3/24, for sale 5/5, shots, 253-6294.

Jeppesen Airway manual binder, 2" leather w/ stay-open bar. ex. cond. 326-9361.

Duncan-Phyfe mahogany drop-leaf dining table. 4 leaves, tailor-made pads. \$75, 296-2844.

Girl's American Flyer stingray. new in 7/72, gd. cond. \$20/best offer, 854-3145 after 3.

Ex. cond.-Olds trumpet, \$100, Armstrong flute, \$80, 252-4535.

Harmony 6-string elec. guitar, \$75 323-1582.

9'x12' green shag rug. \$30, call Genie DeGabain, 965-2394.

File cabinet, 4-drawer, letter size 656-4863 after 6 p.m.

Overhaul manual & parts for 65 Lincoln Continental (convert.) call Don, 262-2629 after 4:30.

Ironrite ironer, gd. cond. \$35, best offer, 255-8507.

Dog barrier for st. wagon, all chrome, adjustable, \$20, 738-3689.

Delightful camera, Minolta SRT101 1.4 lens, like new, w/case, \$185, Tom Edwards, 736-8550.

14 ft. boat, trailer, gas tank, oars, life jackets, 25 hp, Evinrude \$185 241-3025.

Mahogany chest & dresser w/mirror \$150, 241-3025.

Rock maple chest & dresser, \$100 2 maple nite stands \$50, 241-3025.



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

Data from interplanetary spacecraft may aid in understanding weather

Interplanetary spacecraft are giving us a better understanding of the solar system, and they may soon contribute strongly to solving some of our atmospheric problems on our earth. NASA's first Mariner mission to Mars in 1964 greatly changed the meteorologist's concepts of heat transfer processes in a thin planetary atmosphere and this will add to our understanding of processes in Earth's upper atmosphere.

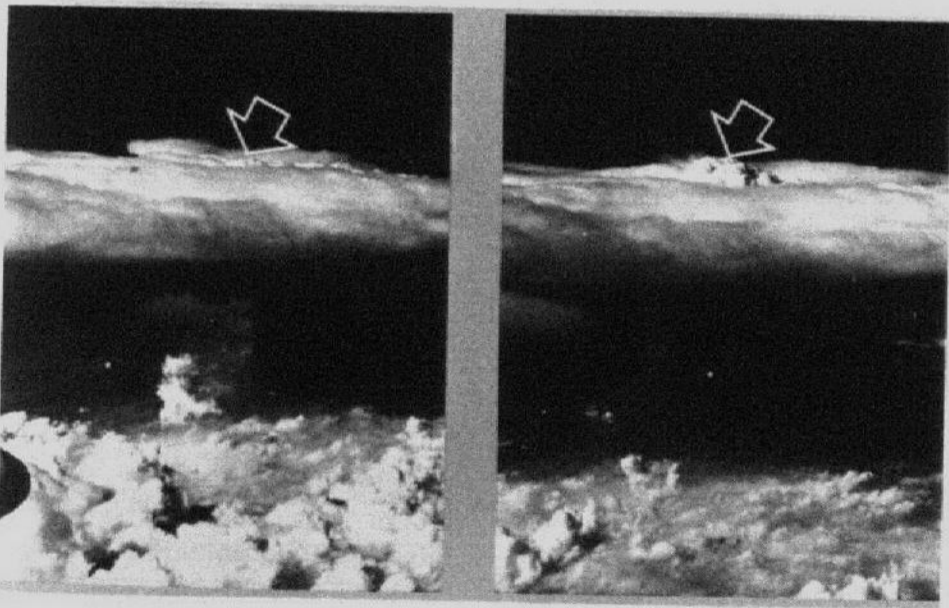
Problems that complicate earth meteorology, such as the mixture of ocean and continent masses, broken cloud layers, and rapid planet rotation, are isolated and exaggerated on Venus and Mars and are therefore much easier to study. For example, Venus rotates very slowly, has no ocean and has a continuous thick cloud cover. Mars matches Earth's 24-hour day and seasons, but does not have the complication of ocean-land masses.

Meteorologists state with cer-

tainty that by studying the three planets, Venus, Earth, and Mars, they will be able to make better short-term weather predictions and to foresee different trends in the Earth's climate.

Scientists already know that it would take only a seven-degree Fahrenheit drop in the average atmospheric temperature on Earth to trigger another disastrous ice age. They also know that on a local scale like in the Los Angeles basin, the smog and smoke particles we dump into the atmosphere are major factors influencing atmospheric temperature. However, they cannot agree on how much smoke and dust it would take to create the seven-degree temperature drop over the globe.

There hasn't been enough data to resolve the issue, not since the great volcanic eruptions of Temboro in (Continued on Page 2)



NASA is considering a new type of weather satellite called SEOS (Synchronous Earth Observatory Satellite) as an early warning system for the general public. While making a "feasibility study" of the future observer, these photographs were taken seconds after the one on the left. In less than two minutes the cloud cell in the thunderstorm spread out one mile vertically and two and one half miles horizontally. After several minutes the cell collapsed. The entire event lasted seven minutes, and severe thunderstorms were reported. Research of this type indicates that such clouds can grow very rapidly in areas where clouds did not exist a few minutes before. NASA believes that SEOS, while making weather observations more frequently and in greater detail, could provide timely warning to the public.

Memorial Service



A memorial service for the victims of the April 12 Convair 990-P3 Orion air crash was held on Ames' flight apron Thursday, April 19. The service was attended by members of the victims' families and over 1000 staff members.

Dr. Hans Mark, Ames Director, and Navy Chaplain, John W. Berger, addressed the assemblage. The text of Dr. Mark's speech follows:

* "This is a sad occasion for all of us at Ames. We are here *
* to pay tribute to our friends and colleagues who perished in the *
* tragic accident last Thursday. There is nothing I can say that *
* will lighten the burden of the relatives and loved ones of the *
* victims. However, I believe that I can try to define what those *
* who died had in common and why it made them unique. I think *
* that the word "courage" best describes the quality. Not the *
* courage to take one great and daring risk, but the every-day *
* kind of courage that permitted them to accept the daily risks *
* associated with scientific research. And there are risks, both *
* physical and intellectual: Research means venturing into the *
* unknown and it always takes a special kind of courage to do that *
* and then to live with the results. Yet it is the one activity that *
* distinguishes human beings from other forms of life: The ability *
* to learn and to pass on that knowledge to our descendants. James *
* Ramsey Ullman captured the essence of what I am saying in a *
* wonderful book he wrote on mountaineering. Let me read you the *
* concluding passage of the book:
* "Over and above all, it is a story of faith and affirmation . . . *
* that the high road is the good road; that there are still among us *
* those who are willing to struggle and suffer greatly for wholly ideal *
* ends; that security is not the be-all and end-all of living; that there *
* are conquests to be won in the world other than over our fellow *
* men. The climbing of earth's heights, in itself, means little. That *
* men want to try and climb them means everything. For it is the *
* ultimate wisdom that man is never so much a man as when he *
* is striving for what is yet beyond his grasp, and that there is no *
* battle worth the winning save that against his own ignorance and *
* fear."
* Although we cannot bring back those who are gone, we can *
* make certain that they will be remembered. The best memorial *
* for them is to re-dedicate ourselves to continue the work in which *
* they were engaged when they perished. I pledge to you that I will *
* work as hard as I can to replace the "Galileo" with a new one. *
* I pledge to you that we will continue to develop our capabilities in *
* airborne research at Ames so that we will be second to no one in *
* this field. In this way, we can be sure that what they did will con- *
* tinue to live."
*

Donations for crash victims sent to many organizations

Donations in memory of those who died in the April 12 air crash may be sent to:

James Remington
TIP
St. Thomas Episcopal Church
Sunnyvale, California

Phil Wilcox
St. Luthern Church
Arques and Sunnyvale Ave.
Sunnyvale, California

John Yusken
American Cancer Society
Santa Clara County
1140 Pedro
San Jose, California

Brice Sorenson
Sorenson Scholarship Fund
for science students
Crocker National Bank
San Antonio Branch
Mountain View, California

Ernest Forslow
Sorenson Scholarship Fund
(see above)

Herbert Cross
Respiratory Research Fund
Stanford University
Stanford, California

Gaeton Faraone
Arthritis Foundation
Northern California Chapter
166 Geary
San Francisco, California

THANK YOU

"Thank you to all our many Ames friends. Your kindness and sympathy is deeply appreciated. the Wilcox family."

Interplanetary spacecraft (Continued from Page 1)

1815 and Krakatoa in 1889, which poured enough dust and smoke into the atmosphere to drop temperatures worldwide over a period of many months. But they didn't have many monitoring instruments in those days. Now a wealth of pertinent new data has been returned from Mars by Mariner 9. A giant dust storm completely shrouded Mars when the Mariner spacecraft arrived in November 1971. As the dust settled and the atmosphere gradually cleared over a period of several months, instruments on the

NASA aids in flood

Several government agencies, both federal and regional, are benefitting from the quick response of Marshall Space Flight Center during the recent flood emergency.

MSFC's Environmental Applications Office had a plane in the air before the rains ended on the morning of March 7. On board was a photographer making infrared pictures vitally needed for analysis of flooded areas, water sources, flow patterns and runoff routes.

Infrared film differentiates clearly between water, soil and vegetation and the pictures depict clearly water boundaries and flow patterns.

The U.S. Geological Survey was monitoring area streams March 16 when it was realized that a very rare event was approaching - flood conditions. The USGS contacted MSFC for help and Marshall agreed to film the Paint Rock and Flint Rivers and Indian Creek. Coverage also took in Brown's Ferry, Decatur and the Tri-Cities area.

Response by the Marshall Environmental Applications Office (EAO) was almost routine because the office has been building the necessary capability at MSFC for the past year in its Earth Resources program.

Since the action began, other "users" contacting MSFC for data were the Civil Defense organization, Tennessee Valley Authority, Redstone Arsenal engineers, the Top of Alabama Regional Council of Government and the North Alabama Regional Council of Governments.

Black and white infrared pictures and color infrared pictures are being used in analyzing damage and in correlating ground-based hydrology measurements with aerial data. This will be useful in calibrating watershed and runoff information.

spacecraft continued to report changes in the temperature profile down to the surface.

The dust absorbs much of the Sun's heat and blocks it from the surface, so that atmospheric temperatures at the surface are reduced by 15 degrees Kelvin (27 degrees Fahrenheit). The data are now being analyzed in computers and should largely resolve the question of what increase in particulate pollution of the whole Earth would drop temperatures enough to start another great ice age.



SHOCK TUBE in Stanford's High Temperature Gas Dynamics Laboratory can simulate spacecraft shock waves up to Mach 10, over 7,500 mph. Loaned to the University's Mechanical Engineering Department by Ames Research Center, the device is being used in studies of smog and space shuttle effects by research associate Dr. Ronald K. Hanson (left) and Prof. Charles H. Kruger.

Ames shock tube at Stanford

When the white-hot skin of a speeding space shuttle pierces the upper atmosphere on the way to a landing, can it upset the delicate chemical balance of the ozone layer the shields us from the sun's dangerous ultraviolet radiation?

And how much nitric oxide (NO) precursor of the whiskey-brown nitrogen dioxide (NO₂) in smog, will be formed by the space shuttle's passage?

Answers to these and other questions are being sought by Stanford University scientists using a gleaming new 40-foot stainless steel "shock tube" loaned to the Mechanical Engineering Department's Thermosciences Division by Ames Research Center.

The \$75,000 research apparatus, in operation since early this year in the High Temperature Gas Dynamics Laboratory, is under the direction of Prof. Charles H. Kruger and Dr. Ronald K. Hanson, research associate. Their present research on space shuttle effects is sponsored by NASA.

The shock tube permits them to analyze in detail the mechanics of atmospheric chemical reactions caused by shock waves up to Mach 10 - that is, 10 times the speed of sound or better than 7,500 mph at sea level. The shock-wave compression generates temperatures as high as 20,000 degrees Fahrenheit.

The strength of the membrane determines how much shock-wave pressure is released in a given

experiment-up to 35 atmospheres or over 500 pounds per square inch. When pressure reaches the desired mark the membrane breaks, releasing a shock wave into the low-pressure portion of the tube.

Elaborate instrumentation at the low-pressure end enables the investigators to measure effects of the shock wave precisely—a feat impossible in the real atmosphere. By using appropriate gas mixtures they can reproduce many of the same chemical reactions, however, that occur in nature.

In addition to the space shuttle investigations the experimenters have scheduled studies of smog formation due to electric power plants which the shock tube can simulate. This work will supplement research already being supported at Stanford by private public utilities through their trade association, the Edison Electric Institute.

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Phone 965-5422

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Editor Jeanne Richardson
Reporters NASA Employees

Deadline for contributions:
Thursday between publication dates

Ames' Technology Utilization Room open to public

The new Technology Resource Room is now completed and open for business in the Technology Utilization Office, room 106, building 230.

Established primarily to facilitate the transfer of NASA technology to the public and private sector, the Resource Room also should be of interest and value to Ames personnel.

All NASA Tech Briefs, now numbering over 5,000, are on file with indexes for easy retrieval. About 70 compilations are available, compilations being consolidations of the more significant Tech Briefs by subject under one cover.

The Resource Room is now the sole depository for the SP-5000 series, which include Technology Utilization Reports that are detailed descriptions of developments and innovations of high promise, and Technology Utilization Surveys



which are comprehensive state-of-the-art accounts identifying substantial contributions to technology by NASA researchers or NASA contractors. Over 125 different titles are displayed for easy access.

Other information includes the NASA Technology Utilization Applications Technology program, technology transfer profiles of several subjects, and a wide variety of gen-

eral interest publications on NASA research spin-off benefits.

The room is equipped for movie projection. One of NASA's most outstanding films dealing with NAS-TRAN (NASA Structural Analysis computer program) is available for viewing.

Several examples of Ames and other NASA center innovations are on display.

Trip to Skylab launch available

For those Ames employees who were unable to go to the Apollo 17 launch, you have an opportunity to attend the Skylab launches tentatively scheduled for May 14 and 15.

The California State Universities at Chico, Fresno, and Sacramento, in cooperation with Ames, are hosting a five-day trip to Florida for the launch, and have opened up the trip to other interested persons. The aircraft is a DCstretch-8, holding 254 people. The trip will cost \$275, plus food and sightseeing, and will leave from both Sacramento and Fresno.

The itinerary includes viewing the launches, a tour of the Kennedy Space Center, time at the Visitor Information Center at KSC, programs with speakers connected with the Skylab, and free time for side trips to nearby Disney World, Cypress Gardens.

College credit is available for those taking the trip. Deadline for application is April 16. Ames employees or their families or friends who are interested in this trip can obtain further information by calling Ames' Educational Programs Office, ext. 5543, 5544, or 6364.



FRENCH AND AMERICAN HELICOPTER ENGINEERS CONFER . . .

Research engineers of France and America, working under a Memorandum of Understanding, covering helicopter dynamics, exchanged information during a two-day visit to the HQS, Army Air Mobility Research and Development Laboratory (AMRDL), Ames. The visit took place March 12 and 13. The French engineers toured the facilities of Ames and later visited the research and manufacturing facilities of two helicopter companies.

Group members are (l to r, front row); Marcel Kretz, Giravions Dorand; Roland Dat, Office National d'Etudes et Recherches Aérospatiales (ONERA); Capt. Jean-Pierre Mermillod, French Ministry.

Second row (l to r): Dr. Robert Ormiston, Project Engineer, Ames, AMRDL; Paul F. Yaggy, Laboratory Director, AMRDL; Dr. Irving C. Statler, Director, Ames, AMRDL; and H. Andrew Morse, Supervisory Engineer, Ames, AMRDL. The Ames Directorate, one of four Directorates of the AMRDL Laboratory, is co-located with the Headquarters of AMRDL at Ames.

Looking for catalog, specifications?

Personnel seeking technical information can save a great deal of time and effort by using a documentation service available in the Reliability and Quality Assurance Office, building 244, room 107. Visual Search MicroFilm service provides the latest complete vendor catalogs, government specifications and government standards.

Vendor catalogs include cover-to-cover microfilms of some 8,500 vendors' catalogs, indexed for easy use. It is particularly valuable to those seeking parts, material, services or equipment from a predetermined vendor; and searches may also be made by product subject matter.

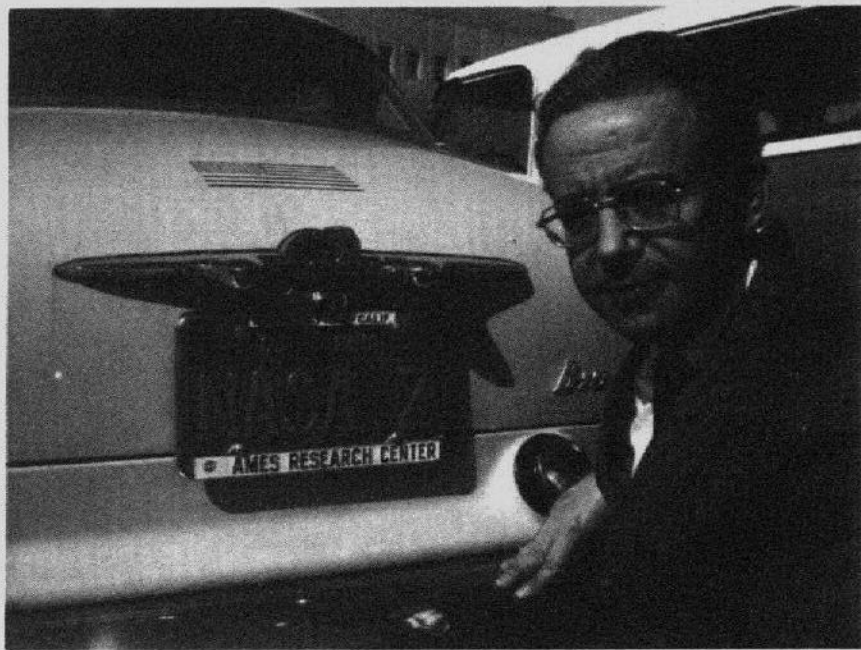
The specifications service comprises more than 80,000 current and historical military and federal specifications, standards and qualified products lists. The data, which is updated every 15 days, can be searched by document number, title or by subject.

The standards service contains more than 13,000 military documents

as well as the federal manufacturers' code identification handbook H4-1 and H4-2. These documents are also updated every 15 days and may be found by number or subject.

"This microfilm service is truly a cost-effective way of maintaining current vendor catalogs and governmental specifications and standards. The R&QA personnel have come to rely upon this service as a valuable tool in doing their jobs," notes Fred DeMuth, Chief of the R&QA Office.

For vendor catalogs or government specifications and standards, go to building 244, room 107. For further information about the service, contact Judy Long, ext. 6422.



NASA LIVES . . . Z translates from Greek to English as "lives." So, Constantine B. Dolkas, LRH, to express his opinion of NASA, ordered license plates for his Volvo that read "NASA Z." Dolkas says, "I'm a nut on NASA, and anything that will keep it going is worthwhile. I think its important that we have a space program, and in my small way I'd like to help."

A LETTER FROM POUGHKEEPSIE

Dr. Webb E. Haymaker, LTN, received the following letter from the K-1 class at Noxon Road School in Poughkeepsie, New York:

"We learned about the moon mice in our Weekly Reader. NASA in Houston, Texas told us that one mouse died but the other four were alive. They also said that you were studying the mice.

We would like to know why the one mouse died and what did you learn from moon mice.

Thank you very much,

Sincerely,

Our Kindergarten Class"

(signed: Angelo, Karen, Diane, Randy, Mathew, Nikki, Marnie, Tony, Mark, Tommy, Debra, Laura, Jennine, Brian, Bobby and Robert.)

Dr. Haymaker wrote back that he and his team were studying all the mice to find the answers to their questions. He explained that they particularly wanted to know if cosmic ray particles had any affect on the mice's brains. And, he said, when they had found the answers he would write the class again.

JOGGERNEWS

On Sat., April 7, 107 eager runners started the Third Annual De Anza Ridge Run, a 10-mile cross country race over the Cupertino foothills. It was sponsored by the Joggnauts.

When the dust settled 2 1/2 hours later, the last of the 102 panting finishers had crossed the finish line after enduring a difficult, but scenic course.

Dan Anderson of Chabot College was the first finisher with a time of 61:20 and Amy Haberman of the San Jose Cindergals was the first woman finisher with a time of 73:14.

Finishing places and times for the Joggnauts were: Jerry Barrack, 42, 77:20; Jim Woodruff, 69, 86:01; George Lenehan, 75, 89:25; Dale Shute, 81, 93:09; and Bob McCracken, 83, 95:48.

The Joggnauts wish to thank all those Ames employees, their families, and friends, who contributed their time and energy to make this event so successful.

WANT ADS

ADVERTISING of articles or services in this publication is restricted to employees of Ames Research Center and on-site employees of support contractors. Articles or services advertised herein must be offered for sale or rental as advertised, without regard to race, color, religion, sex or national origin.

Advertiser must be identified by name, extension and organization. The name may be left out of the ad, but is needed for records. Ads must be submitted in writing to The Astrogram, N241-4, by Wednesday, a week before publication. The advertiser's home phone number must be used except in carpool notices. Ads must be limited to 15 words or less. Ads longer than 15 words will be cut down before printing.

TRANSPORTATION

69 Kawasaki 350, 8000 mi., ex. cond. \$350, 224-1111.

69 Pont. Catalina wagon, AT, PS, PB, AC, tilt wheel, ex. cond., \$1800 243-4826.

63 Rambler American, runs, 6 gd tires, extra pts. \$125/best offer, Gobets, 739-2787.

66 Corvette, 4-spd. am/fm, 35,000 mi. on 69 engine, \$1800, 736-8335 or 736-8497.

62 Ford wagon, country sedan, V8 AT, PS, AC, RH, light blue, \$195, 736-8497.

HOUSING

FOR RENT

S. Tahoe cabin, 2-bdrm, upstairs dorm, 2-ba., 5-mi. from stateline, D. Sinnott, 225-8043.

MISCELLANEOUS

2-manual Thomas organ by Heathkit, ex. cond., \$300. 246-2129 after 5.

Tubular steel frame combin. wheel chair/walker, \$35. Stan. regulation walker, \$10, invalid toilet seat \$5. Barton, 493-9422.

Bdrm set, livingrm & familyrm sofa & chairs, lamps, tables, 18 cu. ft. refrig. 9x12 decor. rug, 739-7042.

16' Tahiti, 140 Merc. 1/O. 6 mos. warranty. Immaculate, sacrifice \$3400, 298-5010 after 4:30.

Mamiya-Sedor camera, 1.7 lens, needs new shutter spring, \$15, Jim Kirwan, 796-9433.

S.F. light opera Gigi, 2 tickets, 5/28, row E, 1st bal. Trade to earlier/later wk. 967-4520.

Binoculars-Swift; 7x35 coated lens, \$35, call Tom 293-8498.

Buffet 48w 37h, light finnish \$50, bookcase 30w 42h \$20, Don Miller 325-4182, evenings.

WANTED

Overhaul manual & parts for 65 Lincoln Continental (convert.) call Don 262-2629 after 4:30.

Asymmetric Model Airplane Contest

Ames staff members and their families are invited to witness the first AIAA Asymmetric Model Airplane Contest May 5, from 9 a.m. to noon in Ames' hangar, N-211.

Hand-launched gliders with a maximum wing planform area of 30 square inches will compete on the basis of design, distance, and endurance. Doors will open at 8 a.m. for registration and practice flights.

Signs will be posted along the route. NASA employees and others with Naval Air Station stickers on their cars will not require a pass and may proceed directly to the contest site.

Happenings

May 5, AIAA Asymmetric Model Airplane Contest, Ames hangar.

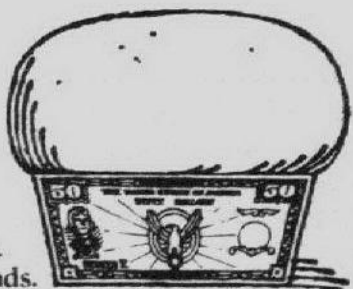
May 3, 10 a.m., bldg. 245, room 296, Prof. Alexandre J. Chorin, U.C. Berkeley, "Random Solutions of the Navier-Stokes Equations."

April 27, 10 a.m., bldg. 245, auditorium, Prof. Frank Millich, University of Missouri at Kansas City "Aspects of Flourmetry in Life Detection/Some Photochemistry of Nucleic Acid Constituents"

May 4, 1 p.m., bldg. 239, room B-39, Dr. Tarold Kvalseth, Georgia Institute of Technology, "Models and Uses of Eye Tracking Data in Aerospace Systems Research"

May 1, 2:30 p.m., bldg. 239, room B-39, Dr. Roy Hughes, Wellcome Research Laboratories, Bechenham, England, "Application of Hemodynamic Techniques to Cardiovascular Pharmacology."

Bread Winner.



Take stock in America.
Buy U.S. Savings Bonds.