

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

Ames Team Makes Shuttle Landings



Silently diving down to earth at over 6,000 feet per minute, the space shuttle vehicle comes within 1,000 feet of the ground before leveling out; a slim 45 seconds prior to landing.

The vehicle raises its nose in what is called the "flare" maneuver and settles lightly on the runway. All this, with not a hand on the controls.

Sound like science fiction? Not for a team of Ames pilots and engineers who have been making these dramatic landings in the "Galileo" CV990 aircraft since June at Ed-

wards Air Force Base. The idea is to show that the shuttle manned reusable vehicle can return to earth by making unpowered airplane-like landings.

Some 45 simulated space shuttle landings were made in June, August, and October with the aid of a super-automatic pilot called a Digital Avionics Flight Control System. More are planned for the spring of next year.

The system was originally designed by the Sperry Flight System of Sperry Rand, Corp. for use in the Boeing Supersonic Transport. It performs all the navigation, guidance, and control functions required to automatically control and guide the CV990 through the space shuttle trajectory to a precision automatic landing on a conventional runway.

The 990 system provides NASA with a research facility for inflight evaluations of shuttle control concepts. It contains hardware and software provisions for navigating with several combinations of possible devices that have been suggested for the space shuttle.

These systems include; inertial navigation system, (INS); conventional Instrument Landing System (LS); VHF Omni Range (VOR); Dis-

tance Measuring Equipment (DME) Scanning Beam ILS, and beacon transponders. The system is presently set up as blended inertial/radio navigation system like those used in commercial airliners, with conventional radio NAVAIDS (Navigation Aids).

A typical space shuttle simulation goes like this: with the aircraft at 39,000 feet the 990's speed brakes and landing gear are deployed and the engine throttles set at flight idle. This makes the 990's aerodynamics similar to the unpowered space shuttle aerodynamics.

The Sperry automatic system is engaged and pilot Fred Drinkwater, III, sets back and folds his arms. The system then takes control (Continued on Page 2)

Lunar Science Before and After Apollo Missions

The article below is taken from the Apollo 17 press kit, a package of information the size of a small novel, compiled for use by news writers.

It is a little more technical than most Astrogram articles, but it should be of interest to, and readable enough for Ames employees

It is printed here because it offers an enlightening comparison of lunar science before and after the Apollo missions. And, because several Ames scientists and engineers have contributed significantly to these accomplishments, it is felt the article is a tribute to them as well as to the Apollo program.

The astronomical observations of the Moon prior to Apollo give us a very detailed picture of the surface of this planet. However, even the most sensitive telescopes were unable to furnish the variety of scientific data that is necessary to the understanding of the history and evolution of the planet. In particular, it was necessary to know something about the chemistry and something about the internal state or condition of the planet before we could do much more than speculate about the origin and past history of the Moon. The most important scientific observations concerning the Moon that existed prior to the direct exploration of the Moon by either manned or unmanned spacecraft are as follows:

1) The mean density of the moon is 3.34 gm/cc. When this number is compared to the density of other planets (this comparison involves a substantial correction for the effects of pressure in planets as large as the Earth and Venus), we see that the density of the Moon is (Continued on Page 3)

New Staff Assistant

The appointment of Frederick J. Styles as Staff Assistant to C.A. Syvertson, Ames Deputy Director was announced recently by Dr. Hans Mark, Ames Director.

Mr. Styles came to Ames in Oct., 1967 after seven years at NASA's Goddard Space Flight Center in Greenbelt, Maryland. While at Goddard he worked on the ECHO, Orbiting Geophysical Observatory (OGO-B) and other spacecraft projects.

Prior to his appointment as Staff Assistant, he was with the Computation Division at Ames with responsibility for the management of several computer software services contracts. He was formerly in charge of a small computer system in the Biotechnology Division of the Life Sciences Directorate.

At Goddard he specialized in spacecraft communication and data handling systems and has co-authored several reports on the subject of telemetry frame synchronization.

His work on the OGO-B Integration and Launch Team brought him a Sustained Superior Performance Award in 1966 for; "... (Continued on Page 2)

BLOODMOBILE

DEC. 22
9 - 12
MAIN AUDITORIUM

Check ID Cards

U.S. Government Motor Vehicle Operator's Identification Cards now take six (6) working days to renew due to a change in regulations.

Employees should regularly check their cards to be sure they are valid.



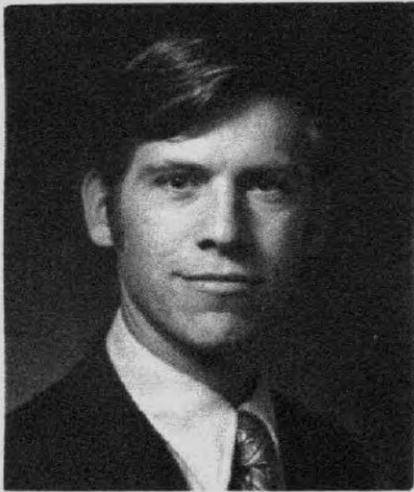
THOSE DARING YOUNG MEN . . . who have been making those novel landings in the CV990 "Galileo" aircraft to simulate the landing of a space shuttle vehicle are (l to r); Herbert V. Cross, SSO, Airborne Science Aircraft Manager; Donald W. Smith, FSN, Assistant Test Coordinator; Gordon H. Hardy, FSO, Project Pilot; Fred J. Drinkwater, III, FSO, Project Pilot; Daniel M. Hegarty, FSN, Avionics Systems Engineer; Frederick G. Edwards, FSN, Test Coordinator; and John D. Foster, FSN, Flight Test Engineer.



PATENT AWARDS . . . were presented recently by Dr. Hans Mark, Ames Director (left) to seven Ames scientists and engineers. The four recipients pictured above, and their inventions are; Gordon J. Deboo, (second from left) RFD, with Clifford N. Burrous, (fourth from left) FSV, who devised a "Temperature Compensated Light Source Using a Light Emitting Diode;" Klaus Heinemann (third from left), SVM, a National Research Council Fellow, for his Electron Microscope Aperture System' and Vladimir T. Zaviatseff, for his Apparatus for Ionization Analysis.

Patent award recipients not pictured, and their inventions are; Robert T. Jones, D, Dual-Fuselage Aircraft Having Yawable Wing and Horizontal Stabilizer; Robert E. Brooks, an employee of TRW, Holographic Real-Time Interferometry; and Robert E. Brooks and Leo O. Heflinger, also an employee of TRW, Holographic Schlieren Method.

Staff Appointment



FREDRICK STYLES

(Continued from Page 1)
the development of the software system used to check out the spacecraft and . . . supervising the component development system and operation."

Immediately before leaving Goddard to join the Biosatellite Project at Ames, Styles was working on the design of digital computer to be flown on a variety of unmanned spacecraft such as the Orbiting Astronomical Observatory.

Born in Ross, California in 1938, he attended Marin Catholic High School in San Rafael. In 1961 he graduated from the University of Santa Clara with a Bachelor's degree in electrical engineering. He

has done graduate work in mathematics and electrical engineering at Catholic University in Washington, D.C.

Santa Claus Store Aids the Needy

The "Santa Claus Exchange," a special "store" where needy families in the Mt. View/Los Altos area may shop free for Christmas, is the primary concern each December of the Mountain View Community Services.

The group provides referral services, emergency help and various types of assistance for the community throughout the the year.

The Santa Claus Exchange enables families who otherwise could not afford gifts or extra food to celebrate the holiday. Clients of the store include the aged, the disabled and the needy.

Volunteer help is desperately needed to prepare the exchange in time for shoppers. Also, drivers are needed to deliver goods to clients or to transport clients to the exchange.

Further information may be obtained by calling 968-0836.

Donations are welcome throughout the year at the Mountain View Community Services permanent home located at 655 Castro St.

Unpowered Space Shuttle Simulations

(Continued from Page 1)

and guides the unpowered 990 through the desired shuttle trajectory which includes; an energy management phase, a two-segment landing approach, a flare, and touchdown.

In landing a large unpowered vehicle, a strategy for energy management is needed, combined with precision navigation, guidance, and control. The aircraft must be brought into the airport terminal area with sufficient energy to be sure it reaches the runway; and, the means of reducing excess energy to make a safe touchdown. The system onboard the 990, built around the Sperry digital computer, makes this possible.

Research test pilots operate the system from the right hand seat of the 990, which is equipped with special displays and control panels, and a side stick hand controller for manual operation. During manual oper-

ations the computer processes side stick commands in response to pilot input. Several simulated shuttle manual landings were completed during last month's test series.

Pilots from ARC, FRC, MSC, the U.S. Air Force, North American Rockwell, and the Sperry Rand Corporation have participated in the flight activities and evaluated the system.

Preliminary results show that automatic approaches and landings of a large, unpowered, vehicle are feasible. Within the limitations of the flight tests it appears that conventional navigation aids, which are widely available throughout the country, can be used to land the shuttle on a standard runway without air breathing engines.

This eases the problem of developing more sophisticated ground NAVAIDS and opens up all airports with these aids as potential shuttle landing sites.



GENERAL PROCUREMENT BRANCH . . . received a NASA Group Achievement Award recently from Louis H. Brennward, Director of Administration, (third from right). During a presentation in his offices Mr. Brennwald congratulated Carl A. Wanke, Chief of the branch, on the group's continued outstanding efforts in coping with increased work loads. The award recipients are; (l to r) John C. Delaney, Acting Procurement Officer; Margaret E. Toland; Kathleen U. Thurman; Hazel F. Espe; Evelyn A. Harper; Joseph E. Rokovich; Margaret B. Roszell; Carl A. Wanke; Joseph R. Schrey; and Donzell J. Norred. Not pictured is Belva Hoegler.

Singers Needed

Singers and musicians are needed for the annual Ames Christmas caroling group. Those wishing to take part should attend rehearsals on Dec. 12, 13, 14 and 15 in the main auditorium lobby at noontime, 12 to 12:30 p.m.

For further details contact Bill Houck at ext. 5462.

astrogram Admin. Mgt. Building
Phone 965-5422

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Editor Jeanne Richardson
Reporters NASA Employees

Deadline for contributions:
Thursday between publication dates

A comparison of lunar science before and after Apollo

(Continued from Page 1)

less than that of any of other terrestrial planets. If we accept the hypothesis that stony meteorites are samples of the asteroids, we also observe that the Moon is lower in density than the parent bodies of many meteorites. This single fact has been an enigma to anyone attempting to infer a chemical composition for the Moon. One thing can be clearly concluded from this fact -- that is, that the Moon has less metallic iron than the Earth. The difference between the lunar density and that of chondritic meteorites is particularly puzzling because these objects have compositions that are similar to those of the Sun once one removes those elements which form gaseous compounds at modest temperatures (hydrogen, helium, nitrogen, carbon, neon, and the other rare gases).

2) The second major characteristic of the Moon goes back to Galileo, who observed that the Earth-facing side of the Moon consisted of mountainous regions that he designated terra, and smoother, physiographically lower regions which he designated mare by analogy with the terrestrial oceans and continents. The albedo or reflectivity of these two regions is markedly different -- the mare regions being very dark when compared to the terra regions. Astronomical studies added a great deal of detail to Galileo's discovery, including some rather fine features such as the rilles which were just barely resolved by good telescopes. However, the cause of this fundamental physiographic difference was not well understood before the era of Apollo. The explanation of relatively smooth mare basins ranged from the conclusion that they were very extensive lava fields to the hypothesis that they were, in fact, dust bowls -- that is, extensive dust deposits. There were even some scientists who seriously suggested that they were filled by a type of sedimentary rock that was deposited at a very early stage in lunar history when the Moon had an atmosphere.

3) The origin of the circular depressions or craters, which are the most common physiographic feature of the lunar surface, was the basis of continual scientific controversy. Two types of explanations were offered -- first, that they were volcanic features similar to terrestrial calderas or volcanic collapse features; secondly, that they were produced by projectiles impacting on the lunar surface in the way that meteorites had occasionally been observed to fall on Earth.

4) In parallel with the role of volcanism on the lunar surface, there were two schools of thought on the thermal history of the Moon. The first held that the Moon was a fairly inactive body which may have undergone some chemical differentiation which, in any event, took place very early in lunar history. The second expected that the Moon was similar to

the Earth with a long and continuous record of volcanism and chemical differentiation. Some adherents to this school fully expected that some volcanism may have persisted to the most recent geologic epochs; that is, as recently as 10-million years ago.

5) The chemistry of the lunar surface was a total unknown before Surveyor V. Nevertheless, there were a number of definite suggestions -- for example, it was at one time suggested that carbonaceous chondrites were derived from the dark mare regions of the Moon. Others suggested that type of meteorite known as eucrites was representative of the lunar surface. Still others suggested that a very silica-rich glass found in mysterious terrestrial objects called tektites must represent parts of the lunar surface. One could not even be sure that these hypotheses were all inconsistent with each other. At this point in time, we will never know the extent to which the Surveyor analyses may have affected our understanding of the Moon. The data returned from these analyses were of surprisingly high quality. They were, however, so quickly superseded by the analyses of the returned samples that there was never sufficient time for them to be completely integrated into scientific thinking on the Moon.

6) Several other results obtained by unmanned spacecraft helped set the stage for Apollo. They are the discovery of the mascons, which require a remarkably rigid or strong lunar shallow interior -- the determination (by Explorer 35) that

the Moon had a very weak, perhaps non-existent, magnetic field; and finally, the observation (by both Russian and American spacecraft) that the lunar backside was very different from the frontside in that dark mare regions were essentially absent from the backside of the Moon.

As we anticipate the sixth manned landing on the lunar surface, we are infinitely richer in facts concerning the Moon. Many of the facts and observations have already been tentatively assembled into theories and models which are leading us to a genuine understanding of the Moon's history. In other cases, it is proving extremely difficult to come up with an explanation that accounts for all of these facts in a self-consistent way. The major areas of understanding which have come out of the unmanned exploration and five manned landings are briefly outlined here:

1) We now have a rather definite and reliable time scale for the sequence of events in lunar history. In particular, it has been established with some confidence that the filling of the mare basins largely took place between 3.1 and 3.8 billion years ago. Since these surfaces represent the major physiographic features on the lunar surface, we can immediately infer that the bulk of lunar history recorded on the surface of the Moon (that is, the time of formation of more than 90 percent of the craters) took place before 4 billion years ago. This is quite different from the terrestrial situation where most of the Earth's ocean basins are younger than 300 million years, and rocks older than 3 billion years make up an almost insignificant proportion of the surface of the Earth. (Continued Next Issue)

Quick Copy Service

The Quick Copy Service was established to:

- Reduce copying costs at the Center.
- Reduce time spent by Ames employees reproducing their own work.
- Provide an essential service for all.

The service has improved greatly in the past year and further improvements have recently been made in our facilities. In most cases the turnaround time will be 24 hours or less. We urge all employees to utilize this service whenever practical and ask that the following limitations be observed:

1. Maximum paper size is 8 1/2" x 14".
2. Maximum number of copies is 20 of any number of originals. (Exception to this limitation requires justification)
3. No requests that infringe upon copyright or other copying regulations will be accepted.
4. Contractor requests must be approved by the appropriate technical monitor.

To place an order, prepare in duplicate a Quick Copy Work Order (ARC 388) and submit it with the work to be copied in a Quick Copy Service envelope (ARC 427) through the regular internal mail system.



THE GANSHIRT LEAGUE TROPHY . . . was presented to Dr. Hans Mark, Ames Director, (fourth from left) by the second place Ames Fastpitch Softball Team; (l to r) Donald B. Kornreich, D, George M. Alger, STM; Bruce C. Ganzler, FLE; Frank W. Steinle, Jr., FAX; and Robert T. Bell, RSS. (Not pictured are; Robert L. Corbett, LVX; Thomas W. Knight, SSO; Jimmie L. Myers, FAX; and Phillip R. Wilcox, SSO.

The Ames team was runnerup in the San Jose Ganshirt Fastpitch League, one of ten San Jose Softball team leagues

Happenings

SPEAKERS

John Palmer, Grad. student, Stanford University, "A Discussion of Some Parallel Computing Techniques for Poisson's Equation," Thursday, Dec. 7 at 9:30 a.m. in Space Science auditorium, bldg. 245, *****

Dr. Melvyn Goldstein, Goddard, "Damping of High Frequency Waves in the Solar Wind and Effects on the Propagation of Low Energy Cosmic Rays"

Friday, Dec. 8, at 10:30 a.m. in Space Science auditorium, bldg. 245.

JOGGERNEWS

The Joggernews are announcing the formation of a special program to encourage physical fitness through jogging and to provide the long term incentive for continued jogging. To participate in this activity, each member need only:

1) Keep a record of the distance jogged since Dec. 1, 1972.

A certificate of Achievement will be awarded after the jogger completes 100, 250, 500, 1000, 2-500, and 5000 miles. After 250 miles the members name will be added to a plaque to be permanently displayed in the Ames trophy case. There no time limits to achieve any of these milestones. All Ames employees and contractors are eligible to participate.

Further details are available from Jerry Barrack, ext. 6093.

WANT ADS

A new Astrogram policy will go into effect with the next (Dec. 21) issue. Want ads will be limited to 15 words or less, including phone number.

Any ad submitted that is over this limit will be returned to sender for rewriting.

This policy has been adopted because the want ads have, for some time, occupied two columns of each issue. Often this space is taken up with paragraph-long descriptions of items that could be described in two words.

So, to allow more space for sports articles, announcements and general news, want ads must be limited to 15 words or less.

To submit an ad, write it out as it should be printed, including home phone number (extensions may only be used for carpool ads), and send to mail stop 241-4. Seller's name and extension must accompany each ad.

AUTOMOBILES

For Sale-1965 Plymouth Fury III 4-dr. ht, gd cond., a/c, 3000 mi. \$365, 259-2235, after 5 p.m.

For Sale-1969 Ford P.U., Ranger Pkg, H.D. 1/2 T, F/R camper spl., 360-V8, 4-spd., L.W. bed, many extras, immac. cond., orig. owner. Sportliner camper shell w/ boat rack optional. Call Dave Gowan 378-5173 after 5 p.m.

For Sale-Sealed bids-The Moffett Field Employees Credit Union has a 1970 VW camper open for bids. It's red, AM/FM, wired for tape, new tires, 4-spd., Min. bid, \$2100. Inquire at Credit Union.

For Sale-1965 Dodge, 2-dr. H/T auto, V8, 7,300 mil., gd. cond., \$475, 961-2782.

For Sale-1960 Chev. std. trans., 283, gd. wrk car, \$150 or best offer, call 735-9431 after 5 p.m.

For Sale-1971 Sherwood tent trailer slps 6. Asking \$695 or best offer, call 225-6550.

For Sale-1963 Chev. Impala, 2-dr. 327, V8, auto. trans., P.S., \$325. Call 253-4106.

For Sale-1969 TR GT6, R&H, new radials, superb cond., \$1800/best offer, call 243-2480 after 6 p.m.

HOUSING

For Rent-3-bdrm house, dead-end st., s. Palo Alto, conven. to Ames & Stanford, \$300/mo plus damage deposit. Jan. 1 thru Jan. 1974, Bob Jackson, 327-6317.

MISCELLANEOUS

Wanted-Shotgun Browning 12-gu. 3" mag, over to under, 30" barrel, mod. to full choke. call 296-1785.

For Sale-6-gal. propane powered hot water heater for camper/trailer. Bowen GH6 w/ integral heat exchanger, heats water from engine while u drive. 7.4 GPH recovery, \$125 new, asking \$65, 1-yr-old. 248-5546.

For Sale-Fr. Provincial console tble sculp. marble top, new cond., orig. price \$70, best offer; large floor stand bird cage w/ all accessories. \$7, call 323-4024 after 5 p.m.

For Sale-Antique Ornate Piano, walnut stool, fluted legs, carving on seat edge, crystal glass eagle claw legs, \$55, call 295-8293.

For Sale-Frigidaire refrig/freezer, \$150, Larry Russell, 252-8316.

For Sale-Tire chains to fit 7.00-14 7.35-14, 6.40-15, 6.50-15 & 7.35-15. Used twice, \$7, J. Boyle, 377-1603.

For Sale-21" color TV, Packara Bell, ex. pic. tube, 2-yrs-old, solid wood console, \$175, 736-3984.

For Sale-Tire chains, never used, fits 7.35-14 & 185-RI4 tires, only \$8. Call Steve Deiwert, 257-6658.

For Sale-Camera, Minolta A2 a 35 mm rf camera. f/2.8 -45mm Rokor lens. Shutter spds 1/400 to 1 sec. & bulb. \$25, call S. Deiwert, 257-6658.

For Sale-1970 Montesa 250-King Scorpion-dirt bike-trailer, see and make offer, 245-9331.

For Sale-5-pc. Gretsch drums, K, Zildjian symbols, drum covers, see & make offer, 245-9331.

For Sale-Sears sewing machine, w/ port. case & sewing table. In gd. wrk. order, \$40, Call C. Davies, 732-2231 after 5 p.m.

For Sale-Sheltie pup, sable, female, AKC. Champ sire won more shows than any other sheltie in sheltie breed history. Avail. now or reserve for Xmas, 493-9391.

Wanted-"Legacy" by Nevil Shute, 493-9391.

For Sale-Engl. riding saddle, Bona Allen type, newleathers& stirrups, \$75, 846-6027.

For Sale-Five 155 x 13 (6.00x13) Firestone radial ply tires, like new, \$60. 252-1929.

For Sale-30-gal. Metaframe aquarium complete w/ flourescent hood, heater, pump, filter, gravel & stand, \$50, 253-6642.

Wanted-Ride. Live near Embarcadero in Palo Alto? If so, why not become the 3rd member of our carpool? Call S. Post, x. 5663/328-8537.

For Sale-Dungan Phyfe table, solid Mahogany, 4-match. chairs, \$100, Formica table, 2 leaves, blnd. grain top, bronze & brass legs, 6 tan chairs, \$50. 296-2675.

For Sale-Roller Top Desk, \$375, round oak dining table & 6 chairs, \$165, various chests, \$20 & up, call 739-2306.

For Sale-4 memorial lots and perpetual care, Oak Knoll cemetery, call 225-4065.

For Sale-Polaroid model 210 land camera w/ model 268 flashgun. Never used, \$35, 578-2283.

For Sale-Heathkit Lab oscilloscope, model 0-12, perfect cond., \$50, call 245-2881.

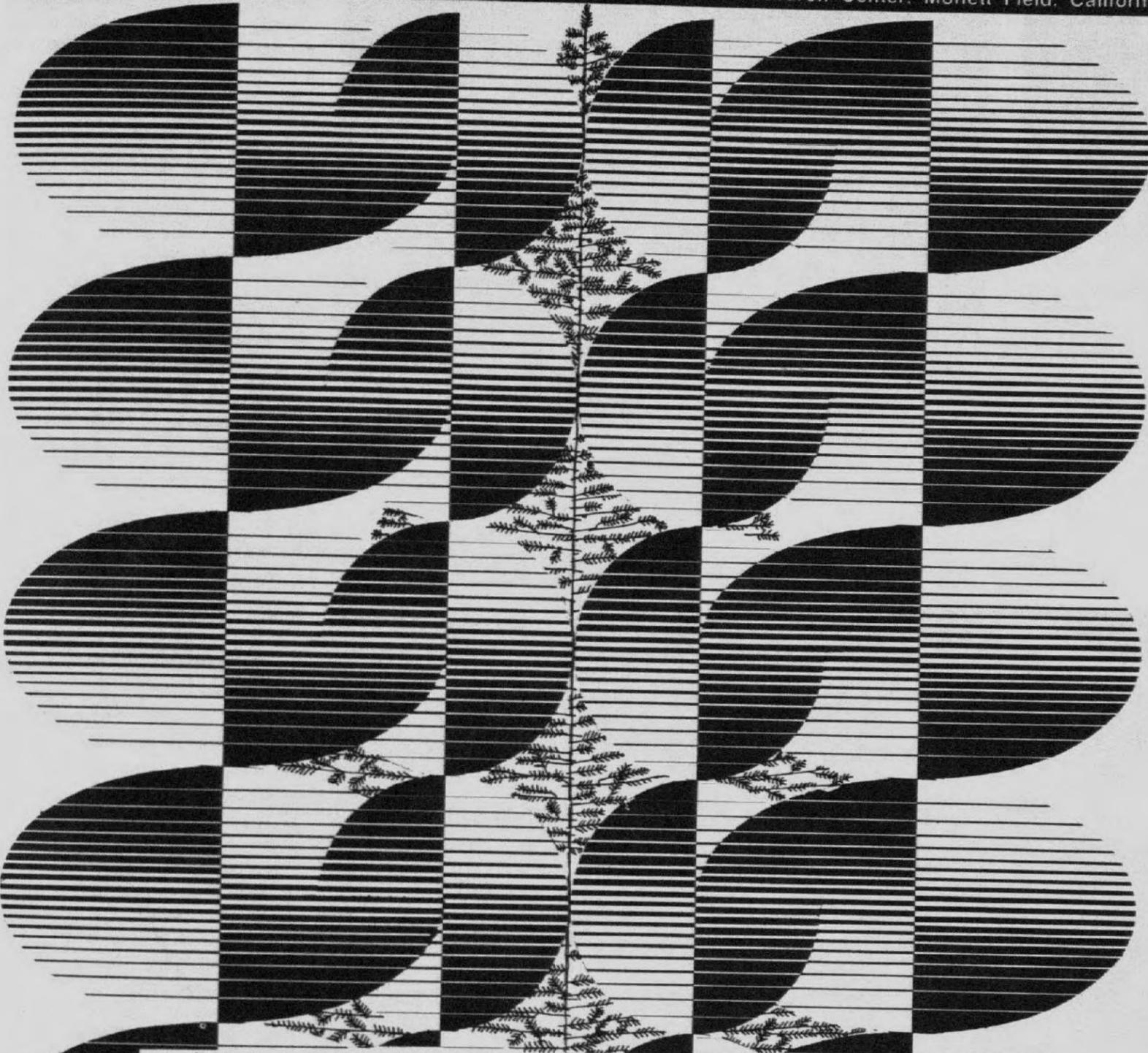


theastrogram

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HAPPY HOLIDAYS '72



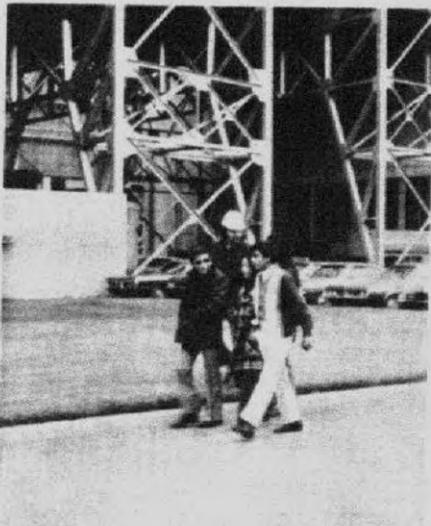
 DIRECTOR'S CHRISTMAS MESSAGE

One of the most pleasant tasks I have is to take this occasion to wish all of you and your loved ones a most happy holiday season and a very happy New Year. We have had serious problems in the past year and I am sure we will also be presented with new ones in the coming year. As in the past, I know that we will regard these problems as challenges and find new ways to apply knowledge and technology for the benefit of all mankind.

Haus Mark
 Director



International youth group visits



A group of 80 youngsters from six continents of the world visited Ames Friday, Dec. 15. They were participants in the International Youth Science Tour, a two-week cross-

country trip for scientifically gifted children, initiated by NASA and conducted with the cooperation of the State Department.

The tour, beginning in Washington, D.C. on Dec. 2, was highlighted by the launch of Apollo 17 in Florida on Dec. 6.

The children came to the Bay Area after visiting Washington, D.C. and Florida, Tennessee, Colorado,

At Ames they were welcomed by Dr. Hans Mark, Director, in the Space Science Building (245) Auditorium. Then, they were given a tour of; the 40- by 80-foot wind tunnel; the Six-Degree Motion Simulator; and the Earth Resources Observations Aircraft.

Three of the youngsters are pictured above with tunnel engineer, Thomas N. Aiken, (in the hard hat) during the tour.



A FAREWELL IN THE RAIN . . . In a ceremony held at the San Jose Municipal Airport recently Ames' George E. Cooper, (right) FSO, Officially gave a retired F-100C (in background) to the aeronautics department of California State University, San Jose. Professor Nick Milovich (left) accepted the plane.

Ames gives retired jet to CSUSJ

An F-100C jet fighter used as an inflight simulator at Ames was donated to the aeronautics department of California State University, San Jose, recently.

The 21,000 pound plane will be used for classroom demonstrations. It is presently being rebuilt as a class project.

The plane was moved to the aeronautics department adjacent to the

San Jose Municipal Airport last May.

George E. Cooper, an Ames test pilot, officially donated the plane on behalf of NASA last month during a small, very wet, ceremony. Cooper was instrumental in awarding the F-100C to CSUSJ.

Professor Nick Milovich of the school's aeronautics department accepted the plane on behalf of CSUSJ.

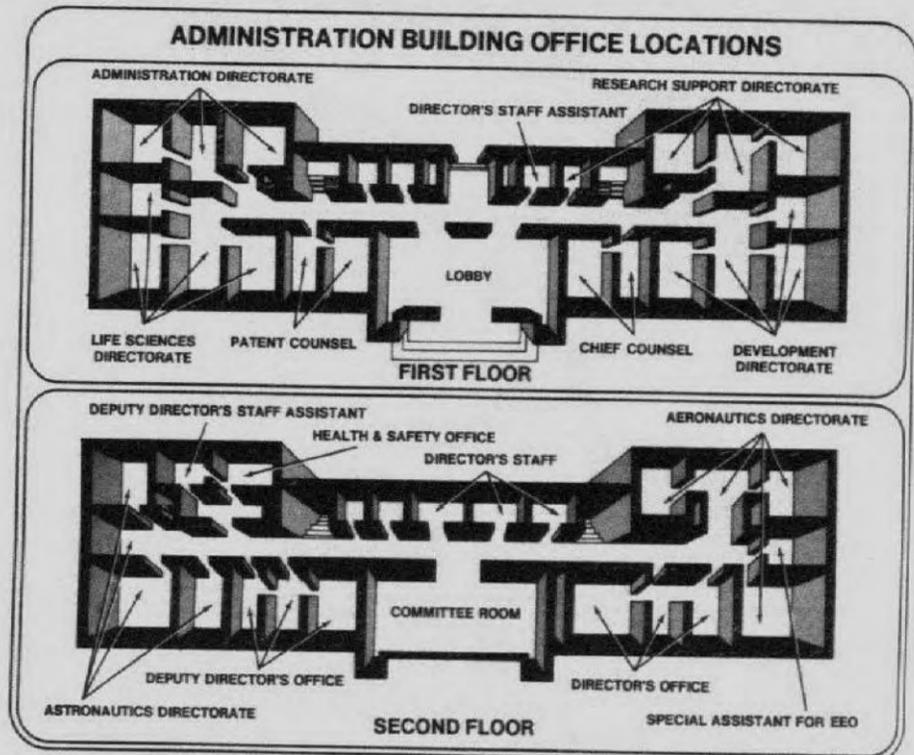
Kvenvolden on national committee

Dr. Keith A. Kvenvolden, Chief of the Chemical Evolution Branch, has been appointed a member of the Panel on Orientations for Geochemistry of the U.S. National Committee for Geochemistry in the Division of Earth Sciences, National Academy of Sciences - National

Research Council.

The purpose of the panel is to define the current status of geochemical research and attempt to identify emerging portions of this science that may be expected to produce the greatest and best return for national research funds.

Updating of building 200 nears end



Work will soon be completed on the last of several projects to renovate and modify Ames' Administration Building (N-200). It is one of the oldest buildings at Ames. The contract for its construction was let Sept. 25, 1942, and it was first occupied in November, 1943.

In those days the Administration Building housed not only Center management, but the Library, Personnel, Procurement, and Central Files, as well as several research groups.

The building has been changed several times in the past 30 years. Present changes are designed to provide integrated space for each of the Center's directorates and for several of the Director's staff offices.

About two-thirds of the organizations housed in the building have been relocated. Present locations are shown in the sketch above.

To permit the building to be used while being changed the renovations and modifications were accomplished in a series of projects. The largest single project involved major changes to the first floor and the basement, which was upgraded to house the Center's communications functions. This largest project cost \$250,000. There were five

other, much smaller, projects.

When completed the cost of all of the work on the building, both contracted and in-house, will total about \$500,000. The renovations spanned a period of more than two years; personnel housed in the building were relieved to have the end of disruptions in sight.

The work on the Administration Building is part of a broad program to update, rehabilitate, and generally revamp both research and institutional facilities at Ames. The Ames Library, housed in building N-202, is one example of the results of this program.

More recently, work has begun to update the 40- by 80-foot Wind Tunnel. This tunnel was first operated in 1944. The present project will cost \$6.5 million and will involve extensive rehabilitation and modification of the facility.

Early next year rehabilitation of the Aircraft Hangar (N-211) will begin. This project, authorized at over \$1 million, will completely renovate the permanent office and shop areas. At the same time an additional 9,000 square feet of office and laboratory space will be constructed so that temporary wooden structures inside the hangar can be removed.

SPARCS and Apollo look at atmosphere

One of the tasks of the Apollo 17 mission was to determine if the moon has an atmosphere. Some scientists think it may have a residual atmosphere; the remnants of what, at one time, was an atmosphere.

To determine this, and perhaps detect its composition, two experiments were conducted simultaneously.

One, aboard the command module, "America," provided by Dr. William Fastie of John Hopkins University, was designed to detect faint traces of gases near the moon. This was accomplished by determining the ultra violet spectrum of the light reflected from the moon's surface.

If there is a residual lunar atmosphere the light coming from the sun will be changed by the residual gases as it is reflected off the moon.

For comparison a measurement of the sun's ultra violet spectrum was taken by the Solar Pointing Aerobee Rocket Control System (SPARCS) payload launched by Ames Dec. 13 from Texas.

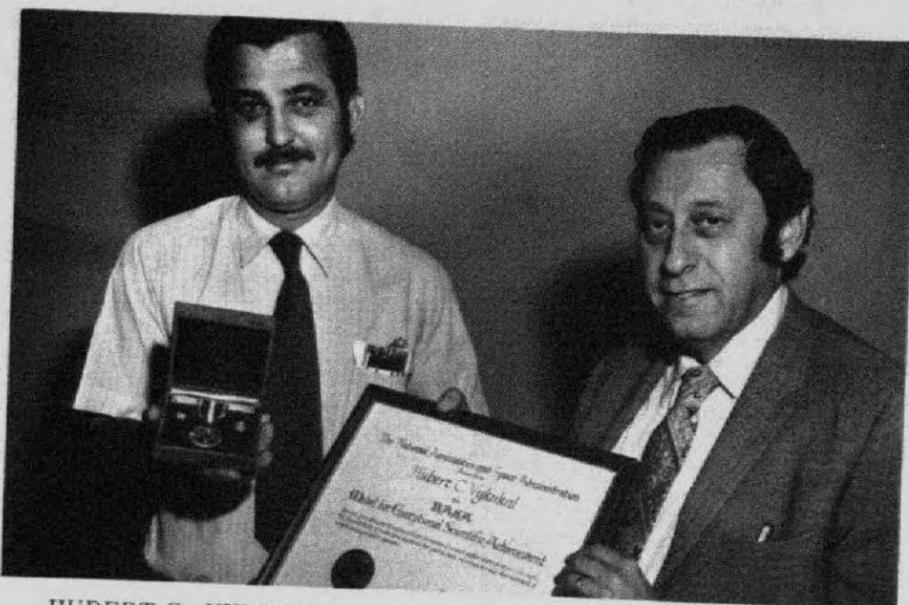
SPARCS payloads have very successfully collected data about the sun during 28 launches over the past two years. The rocket is launched to 135 miles above the Earth. It electronically points toward the sun, collects data, then falls back to earth. As it falls, parachutes open and the payload lands gently enough to be recovered, refurbished, and usually reused.

The payload launched Dec. 13 carried the Apollo 17 experiment package provided by the University of Colorado, for which Dr. Elmo Bruner was principal investigator. The calibration data collected by it will be compared to that collected by the "America experiment" to determine if the moon does have a residual atmosphere.

All payload functions for the Dec. 13 launch (exclusive of the Aerobee rocket) were provided through the SPARCS project. The payload was integrated and tested by personnel in the Ames Flight Project Development Division. The SPARCS project manager, Edward Gabris, served as the Mission Chief.

The field crew for the launch was made up of personnel from Lockheed Missile and Space Co., including Max Reeves, Norman Strong, Thomas Laughlin, and Richard Marty.

Ames Award Winners



HUBERT C. VYKUKAL . . . was given a NASA Medal of Exceptional Scientific Achievement recently by Dr. Harold P. Klein, Director of Life Sciences. Dr. Vykukal received the medal for his accomplishments in developing new technology for space suits. The award was presented at Ames because Dr. Vykukal was unable to attend the official ceremony in Washington, D.C. on Nov. 9.



THE PIONEER 6 - 9 TEAM . . . is pictured above on the occasion of its recent NASA Group Achievement Award. They are (l to r): First Row, Lee Peckham, retired; Carl H. Keller, PED; Howard F. Matthews, PE; J.E. Lepetich, PAE; Charles F. Hall, PA; John V. Foster, P; Ralph W. Holtzclaw, PAS; Robert U. Hofstetter; PAL, John H. Wolfe, SSS; Robert (Skip) R. Nunamaker, PAF; David B. Sinnott, PAE. Second Row, Peter W. Waller, DI; Morton Bradski, PEG; Dave W. Lozier, PAL; Sandra F. Pollock, PA, Edward Itchler, ; Linda L. Marienthal, PED; Richard O. Fimmel, PAF; Norman J. Martin, PAF; Eva S. Somer, PA; Jeanne L. Clemson, AAC; Bradford P. Gibbs, AAC; Arvid S. Natwick, PAF; Robert DeRenzy, AAC; Ernest Iufer, retired. Third Row, Larry B. Hofman, PED; Bill O. Garden, Jr., PAS; Angelo Frosolone, retired; Donald B. McKellar, PA; Joseph L. Frank, PAS; George J. Nothwang, PAS; Eugene Jesse, PAS; Alvin J. Wilhelmi, PAE; Thomas Wong, PAE; Winifred I. Malloy, AAC, Dale R. Lumb, PED. Fourth Row, Emmanuel H. (Skip) Gross, PED; Gilbert A. Schroeder, PAF; Dean M. Chisel, PEG; Bob W. Jackson, PS; Myles D. Erickson, PF; Ted T. Weber, PAS; Richard D. Johnson, PAL; James R. Phillips, PAL; Lewis W. Dickerson, PAS; Robert L. Edens, PAS; George S. Schimmel, PAS; Willis L. Kimball, ASD; Eldon W. Kaser, ASD; Ruben Ramos, PED.

A look at lunar science before and after Apollo

The article below was begun in the last issue of The Astrogram and is completed here. It is taken from the Apollo 17 press kit, a package of information compiled for use by news writers.

Concepts of lunar geology, geography, chemistry and history prior to space exploration were described last issue. The first of several areas of understanding (a time scale for the sequence of events in lunar history) resulting from exploration was explained. The remaining major areas are briefly described below.

Scientists have hoped to find lunar rocks dating back to the formation of the Moon. To date, this goal has eluded them. The intense bombardment of the Moon by projectiles that range up to tens of kilometers in diameter (several miles) has apparently been rather effective in resetting the clocks used to determine the absolute ages of rocks.

The relative importance of volcanic and impact produced features on the lunar surface is today rather well established. There is almost unanimous agreement that the dark mare regions are, indeed, underlain by extensive lava flows. Almost all craters appear to be caused by impacting projectiles.

The Moon has a crust more than 60 kilometers (36 miles) thick. More precisely, there is a seismic discontinuity at this point. The precise origin of this discontinuity is still a subject for debate.

A much more detailed understanding now exists about the Moon's magnetic field. The Moon has a surprisingly strong but variable field. Information about the magnetic field presents serious problems in forcing assumptions which are not entirely consistent with what some scientists hypothesize about the Sun and the early history of the Moon.

None of the three theories regarding the origin of the Moon - that is, separation from the Earth, capture from a circumsolar orbit or formation from a dust cloud surrounding the Earth - can be absolutely ruled out from the present data.

The chemical difference between the Earth and the Moon, however, must be explained if the Moon was torn out of the Earth.

"Ames Airings"

Combine the sight of history being made add warm sunlight, a visit to America's first colony, throw in a feast (including two roast pigs), add motorbikes and a couple of guaranteed-hang-over parties; you have the Ames trip to Apollo 17 launch and Bermuda.

The Ames Recreation Association Executive Board has worked hard in the past to make Ames folks happy, but they outdid their own record this time.

Janet Konrath, in particular, has been mentioned over and over again by participants for her valiant efforts to get 250 people to the right place at the right time, with the right key or ticket in their hand.

Although one would expect long, eloquent descriptions of the launch, all I've gotten was; "It's too spectacular to describe well." Or, "You would just have to be there and see the whole sky light up, hear the rumble, and watch three fellow tourists jot-off to the moon. Incredible!"

The Ames gang didn't mind the two-hour launch delay at all. Their buses were equipped with bars, so they gamely sipped and watched Mother Nature create a dramatic backdrop of lightening and shooting stars behind brightly-lit pad 39.

After the launch it was to the rooms for a couple of hours sleep, then sight-seeing in St. Augustine, Fla. On Saturday the group flew to Bermuda.

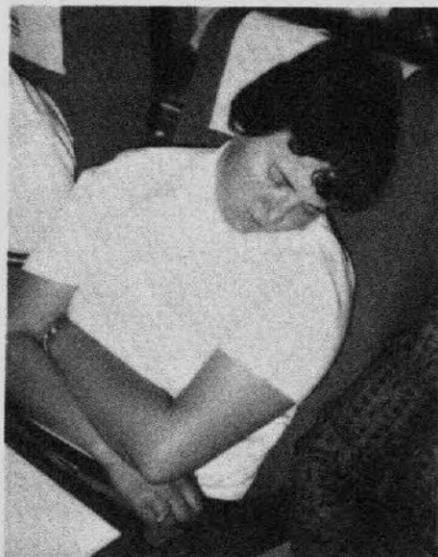
The only unfortunate incident of the trip took place just after arrival at the Bermuda airport.

Phyllis Ogles (retired from the Photo Technology Branch), became ill, and required hospitalization for the remainder of the visit. She is reportedly doing fine now; her doctors said it was probably brought on by fatigue.

Sounds like a high point of the stay in Bermuda was motorbike riding. Due to Bermuda's sensible attitude toward cars there is a shortage of them on the island. So, our innovative Ames folks rented motorbikes and "easy-ridered" it. To give you the picture; imagine Dorothy and Brad Evans cruising by in their crash helmets.

The group completed the visit with a banquet, including two roast pigs, Saturday evening. They flew home, arriving in the Oakland International Airport Sunday evening.

For those with wanderlust the following note from Charlotte and Jack Clementson (retired from Technical Services) will bring tears



... As visions of 250 lost room keys danced in her head,

to the eyes.

They are writing from their yacht "Eleuthera," now anchored at Columbia, South America.

"... After leaving San Diego the 10th of November, 1971, we spent 4 months in Mexico. With a most enjoyable and unexpected 2 days with the Monroes (Leroy Monroe, ASB) in Acapulco. Then on to Costa Rica - 3 months visiting and cruising the coast of that most wonderful country.

"Climate, people, everything about Coasta Rica is good. Then down the coast of Panama, Las Perlas Islands, all is very tropical, very beautiful, and the fishing is fabulous!

"We transited the Canal in fine style, as a matter of fact, we are old timers in transiting the canal now. In addition to taking our own boat through, we have been crew and line handlers on three other boats, all friends we have made during our cruising.

"Then came 6 weeks of cruising the San Blas Islands. Off the north coast of Panama in the Caribbean, the islands and the San Blas Indians are most interesting. Then back to the Canal Zone for provisions, and we are now on our way to the Gulf Coast of Texas, Corpus Christi, Houston and on around to Florida later next year."

Take stock in America.



Give
U.S. Savings Bonds

WANT ADS

Automobiles

FOR SALE

'67 V.W. bus, semi-camper, ex. cond., new upholstery, \$1395, call 379-4664.

'67 Mustang, new Dyna Glass tires, will sacrifice for \$800. Call 298-5010 after 4:30 p.m.

'65 VW, gd. cond., new tires, recon. motor, \$550, 967-2312 (4:30-6 p.m.) 656-3335 after 6 p.m.

'70 Ford Torino, 4-dr hdt; 33,000 miles; clean; \$1,700. Call Tony, 941-7260.

'63 Fairlane wagon, 260 V8, new tires, \$300. Call 379-2385.

'70 Ford Torino, 4-dr hdt; 32,000 actual miles, clean, \$1,700. Tony - 941-7260.

GOLF

The results of the election for the 1973 Ames Golf Club officers are as follows: President, Larry Hochstein; Vice-President, Vance Oyama; Secretary, Jack Lee; Treasurer, Clark White; Handicap Chairman, Frank Lazzeroni.

The following dates have been set for the 1973 Tournament Schedule:

Feb. 3 - Pleasant Hills
March 3 - Oak Ridge
April 21 - Pajaro
May 5 - Alameda Muni-North Course
June 2 - DeLaveaga
July 7 - San Jose
August 11 - Aptos
Sept. 8 - Laguna Seca
Sept. 29 - Santa Teresa
Oct. 16 or 23 - Las Positas
Nov. 3 - Riverside
Dec. 1 - San Ramon

Booklet available

A new six-page brochure, published by and entitled "NASA" is free to Ames employees. The booklet describes America's future space missions and the advances made in the space sciences and aeronautics by past missions.

It is the eighth in a series of pamphlets designed to simply describe the U.S. space program. All eight are available by written request from the Ames Audio-Visual Facility, c/o Public Affairs Office, Mail Stop 204-12. Requests must be in writing, no telephone requests will be honored.

Indicate the number wanted, and include name and mail stop.

Housing

FOR RENT

1-bdrm. apt., Sunnyvale, AEK, carpets, drapes, yard, carport, \$145/mo. & deposit, 948-5968.

3-bdrm, unfurn. duplex, S. Palo Alto, 10 min. to Ames, avail. Jan., \$310/mo., 321-7794/493-6831.

Avail. Jan. 1 - small 3-bdrm, 1-bath house, Palo Alto, \$265 & utilities. 493-4488, evenings & weekends.

4-bdrm, 2-ba. house, avail. Feb. 1, Sunnyvale, \$375/mo. or \$44000, call 245-8533.

FOR LEASE

Unfurn. 3-bdrm, 2-ba. house, new w/w, drps., paint, 5 min. to Ames in S.V., \$275/mo.. 736-0916.

Miscellaneous

WANTED

Workshop manual for '66 Dodge Coronet series, phone 374-2021.

Carpool-Blaney/Bollinger area, non-smoker, reg. shift, max. 4-people. Rasmussen 6117/257-2848.

Slide rule, K&E, old (@ 20 yrs.) gd. cond. W. Starr, 326-1851.

FOR SALE

6-yr. crib & mattress & deluxe stroller, all in gd. cond., \$30. call 265-4168.

1 Mediterranean dining table & 6 chairs, 2 leaves, \$165, 739-2306.

Amateur radio gear, Hallicrafters SX-101A, Heathkit DX-60B w/ VFO (HG-10B). Call Bill Hightower, 326-9361.

4 Haig ultra "pro" woods, \$35, call Joe March, 296-3728 after 5 p.m.

10" Sears tricycle, ex. cond. \$8. white roller skates, size 11 (4-yr old) \$2, 736-8497.

Panasonic (BSR) record changer w/ wood base, see-thru cover, 45 adapter. \$25, V. Nicholson, 326-0204.

French Besson pro. trumpet, ex. cond., \$400 value for \$200. Dave Wilson, 356-8316.

Dalmation pup, male, AKC, ch. sired, shots, 10-wks old, \$100, H. Nelson, 941-5206.

A review of Ames' 1972 major accomplishments

mice experiment

* The Ames BIOCORE experiment was successfully flown on Apollo 17: the experiment involved sending six pocket mice into space to determine the effects of high energy heavy particle radiation on the brain. Since pocket mice had never before been exposed to the Apollo environment, successful implementation of the experiment required intensive preliminary research studies on the animals.

blood flow sensors

* Noninvasive Doppler ultrasonic sensors were developed for monitoring eye-level blood flow. The technique can be used to warn of impending "blackout" during reentry or aircraft flight conditions.

microscope breakthrough

* A new annular aperture has been developed for existing electron microscopes which, for the first time, permits observation of microscopic details as small as one Angstrom.

Pioneer 10

* On March 2, 1972, Pioneer 10 was successfully launched on its fly-by mission past Jupiter. The spacecraft is now more than half way through the asteroid belt and is performing satisfactorily. The scientific instruments on board Pioneer 10 are returning data on particles and fields in the interplanetary medium and on the nature of the asteroid belt. Pioneer 10 is the first spacecraft to explore the regions beyond the orbit of Mars and will be the first man-made object to leave the solar system.

yawed wing

* The yawed-wing concept was proposed by Dr. R.T. Jones as a way to achieve supersonic transport capability without the penalties of high fuel consumption and noise associated with conventional SST aircraft. The design has a conventional straight wing during takeoff and, as the aircraft reaches the speed and altitude where swept wings are efficient, the entire wing rotates about 45 degrees. Extensive wind tunnel tests this past year have verified the expected improvement in aerodynamic efficiency at transonic flight speeds.

* Ames Earth Resources Survey Aircraft assisted state and local agencies in disaster assessment and fire fighting. Crews fighting the Moleria-Big Sur fire were able to leave the fire lines one day earlier than expected because of the aerial photographs obtained by Ames.

* In conjunction with Pan American Airlines, Ames researchers conducted a successful simulator and flight program in a Boeing 747 airplane leading to FAA certification of a head-up display designed to prevent short-landing accidents.

* The Augmentor Wing Jet STOL Research Aircraft (Modified C-8) made its first flight on May 1 at the Boeing Company in Seattle and was delivered to Ames on July 31. In August, a flight test program was initiated to prove the augmentor wing concept. The aircraft has been flown approximately 50 hours in which STOL takeoffs have been achieved in approximately 650 feet of ground roll.

honors and awards

* Dr. Hans Mark, NASA Medal for Distinguished Service; Dr. Klaus Heinemann, NASA Medal for Exceptional Scientific Achievement; Dr. Helmut Poppa, NASA Medal for Exceptional Scientific Achievement; Dr. Hubert Vykukal, NASA Medal for Exceptional Scientific Achievement; Dr. Charles Sonett, NASA Medal for Exceptional Scientific Achievement; Dr. Palmer Dyal, NASA Medal for Exceptional Scientific Achievement; Woodrow L. Cook, NASA Medal for Exceptional Service; Willie L. White, Jr., NASA Equal Employment Opportunity Award; Pioneer 6-9 Team, NASA Group Achievement Award; C. Thomas Snyder, Dryden Fellowship; Victor L. Peterson, MIT SLOAN Fellowship; Charles Kubokawa, Japanese National Aerospace Laboratory Fellowship. (Continued on Page 3)



theastrogram

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RECENT COURSE CHANGE

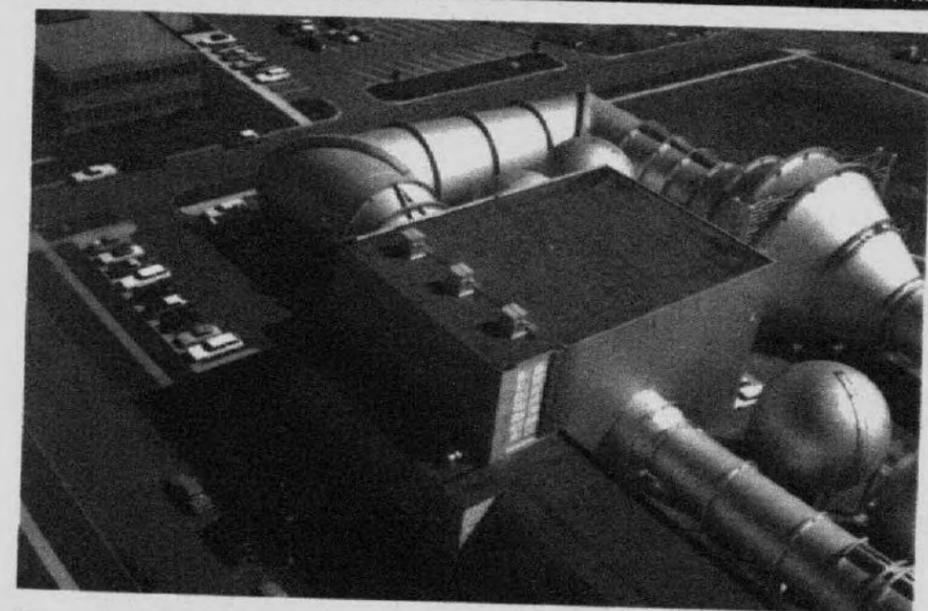
Pioneer 10 to pass behind Io

A recent course adjustment of Pioneer 10, en route to Jupiter, will hopefully cause the spacecraft to pass behind the planet's orange satellite, Io. This would allow scientists to measure Io's atmosphere, if any, as spacecraft radio signals pass through it.

Trajectory analyses show that a brief firing of spacecraft thrusters September 19, 1972, sped up the Pioneer by .745 feet per second. This means that Pioneer 10 will arrive at Jupiter 17.2 minutes earlier -- at just the right time for Io to pass between it and the Earth. Io will then be about 330,400 miles away from the spacecraft.

Scientists believe that Io may have an atmosphere of nitrogen or methane. Changes in Pioneer 10's radio signals as they graze the satellite and pass through this atmosphere would allow experimenters to calculate its characteristics.

Io is about the size of the Earth's Moon. Seen through a telescope it is distinctly orange, and is the most reflective object in the solar system. Io is brighter than normal for about ten minutes after it emerges from Jupiter's shadow, and scientists believe this means there is a temporary deposit of ice when Io is in Jupiter's shadow and this melts again when Io is back in sunlight.



Ames to build wind tunnel sound barrier

Construction of a wind tunnel enclosure to act as a sound barrier for noise generated by a 200,000 horsepower compressor at Ames will begin this week under a half-million dollar contract with the Peoples Construction Company of Mt. View.

The eight month construction project is to erect an acoustically sealed metal shell around the Ames 11-Foot Transonic Wind Tunnel to trap noise that might reach nearby residents.

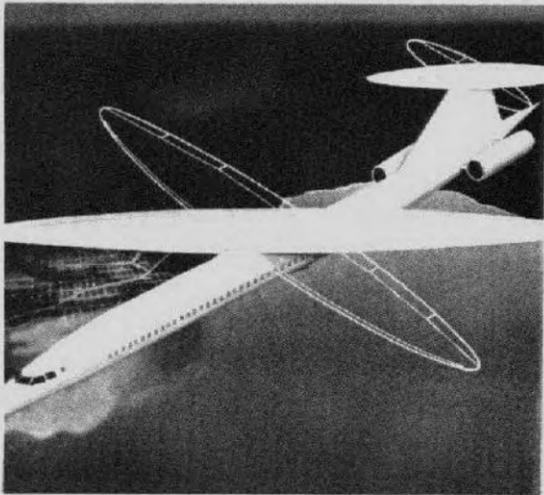
A recent study showed that the blades of a 24 foot diameter compressor, while driving air through the tunnel test chamber at about six-tenths the speed of sound, create a sound pitched about one octave above middle C.

When atmospheric conditions are just right, the sound can be heard above the ambient noise level in

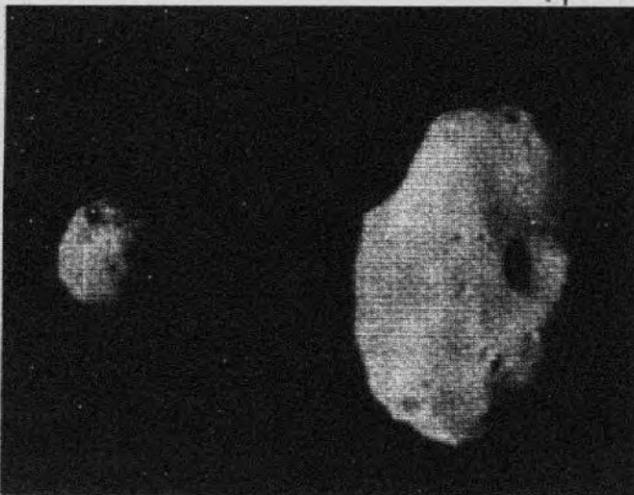
some locations of the surrounding community. This is particularly true because the ear is especially sensitive to this frequency.

The study showed that the enclosure design will significantly reduce noise penetration into the surrounding community from 10 to 30 decibels (a measure of sound levels). This means the sound will be below the normal existing noise level in the community.

The 11-Foot Tunnel is one of the special test devices for aeronautical research at Ames and is considered a national facility by virtue of its wide use by the military services, industry and others engaged in advanced aeronautical research. The tunnel gives aerodynamicists the ability to study aircraft behavior at critical speeds before actual flight.



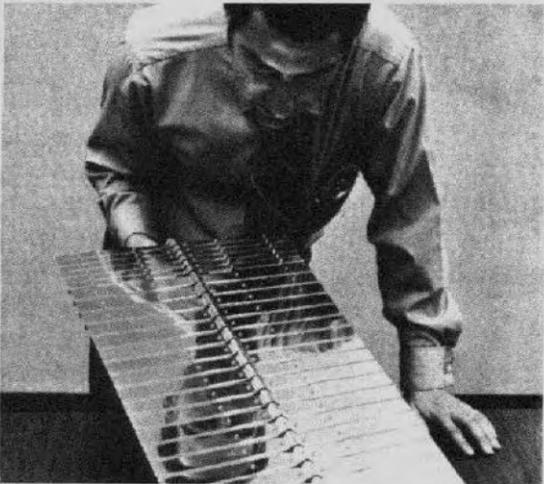
R.T. Jones' Yawed Wing concept developed



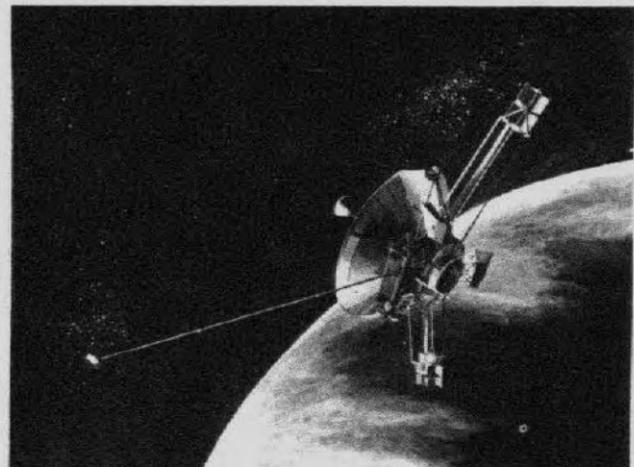
Phobos and Deimos are photographed for the first time.



BIOCORE Experiment flies on Apollo 17



Heat Pipe Experiment launched aboard OAO



Pioneer 10 mission to Jupiter is launched



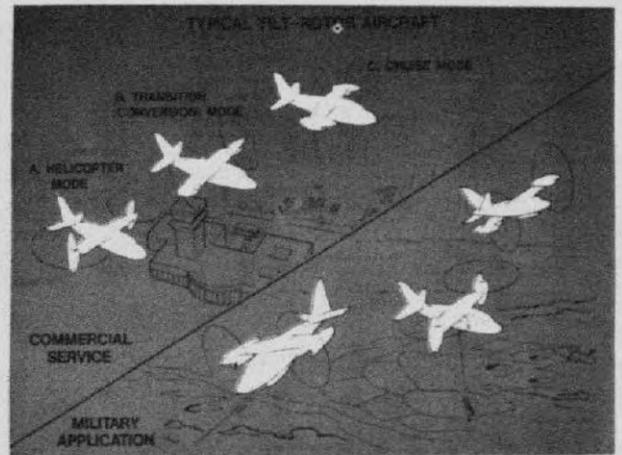
Annular aperture for electron microscope is developed



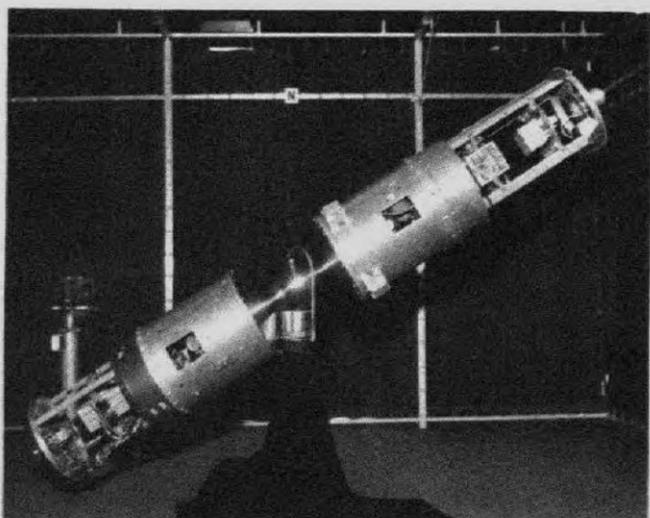
Earth Survey Aircraft helps fight forest fires and aids in flood and pollution control



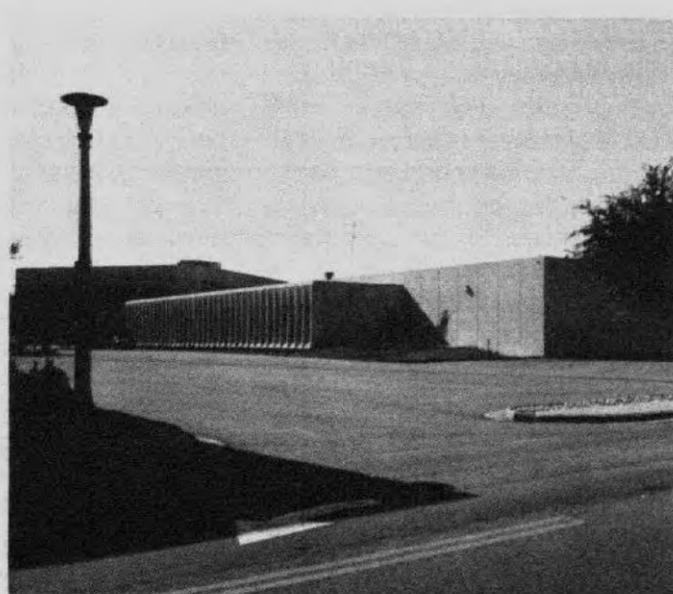
Several research projects conducted with Convair 990 "Galileo"



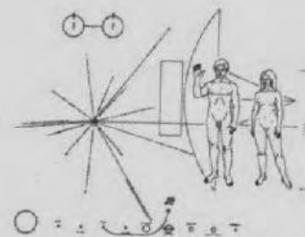
Tilt Rotor aircraft is developed



The Ames sounding rocket control system, SPARCS, achieved pointing stability of better than 0.5 arc-seconds about the experiment reference axis during two launches in 1972.



Illiack IV is installed



Message to extraterrestrials carried on Pioneer 10

ASTROGRAM Admin. Mgt. Building
Phone 965-5422

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Editor Jeanne Richardson
Reporters NASA Employees

Deadline for contributions:
Thursday between publication dates

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A review of Ames' 1972 accomplishments

(Continued from Page 1)

* Computer programs based on small disturbance theory were developed for solving three-dimensional transonic flow about lifting wings including the effects of sweep, taper, camber, and twist.

equal employment

* The Center substantially increased its contract awards to minority business enterprises by \$127,000 over the 1971 figure of \$323,000. The President's Stay - in - School Program doubled from 25 in 1971 to 50 in 1972.

Illiac IV

* The ILLIAC IV Parallel Processing Computer System has been delivered and installed in the new facility. Check out tests on the computer are underway. Research on the Unicon - the optical memory unit for the ILLIAC - has resulted in a redesign of the Unicon. Automatic systems were incorporated to monitor the health of this unit.

* Developments continued in the use of implantable telemetry units to measure cardiovascular function. An implantable electromagnetic flowmeter system was developed and successfully tested. Implantable pressure and EGG units have now successfully operated for periods of two years. Animals with implantable units (not functioning any longer) have now successfully survived for five years. These results are very promising for use of such devices in man at a future time.

* A program was initiated to investigate methods of detecting wake turbulence behind large aircraft. Unique instruments such as a rotating hot wire and a 2-dimensional laser-doppler velocimeter have been developed that permit detailed measurements of the growth and dissipation of wake vortex. Also, a joint NASA/FAA flight program was conducted to assess the effects of the vortex wake on trailing aircraft. Both the Ames Lear Jet and the CV-990 were used to fly behind a B-747, C-5 and a DC-10 aircraft.

* Nitro-aromatic amine derivatives were identified as intumescent agents. This discovery has led to the development of a whole series of thermal protection coatings which are currently being used for cook-off thermal protection of various ordnance devices against fires.

* Magnetic fields produced by the human heart have been measured using instruments developed to test spacecraft. Non-invasive magnetic measurement of nerve signals is believed to have considerable potential in diagnosing certain types of nerve pathology.

* Two Ames magnetometer experiments were included on the Apollo 16 mission in April, 1972. One stationary instrument was part of the ALSEP and one portable instrument was part of the lunar roving vehicle experiments. Significant finding was a 313 gamma field measurement in the lunar highlands; the highest yet measured in situ on a planetary sized body other than earth.

liquid cooled helmet

* A liquid cooled helmet and portable cooling system developed for military helicopter pilots

has undergone successful flight tests at Ft. Rucker, Alabama. This lightweight and relatively simple system resulted from the discovery by Ames scientists that total body comfort could be provided in hot environments by cooling only the head.

new computer language

* A new, FORTRAN-like language, CFD Code, has been developed for writing efficient computer programs to solve fluid dynamics problems on the ILLIAC IV parallel processing system.

* The NASTRAN structural computer code was used to compare the aeroelastic properties of the core structure for an aeroelastic wind tunnel model with those of the actual vehicle. The technique provided a means for rapidly evaluating the effects of various design details, making the use of an iterative design approach feasible.

* Acceptance tests for the STOLAND advanced digital avionics system to be integrated with the simulator at Ames were conducted in December. The STOLAND flight system was delivered in December and is being installed in the CV-340 with flight tests to begin in February, 1973.

water in Martian soil

* Ames scientists, in collaboration with Cornell University, performed an experiment from the Ames Convair 990 which showed that significant amounts of water were chemically or physically bound in the Martian soil.

* A differential radiometer was successfully developed for monitoring chlorophyll in lakes. Six were built; four of which are being used by the EPA for a nationwide surveillance of lakes.

* A bed-rest study to simulate weightlessness and evaluate the effect of exercise while in a supine position as a means of averting the cardiovascular deconditioning associated with bed-rest was conducted. Moderate leg exercise by bicycle and isometric exercise (lifting weights by the legs) failed to significantly influence deconditioning as measured by acceleration tolerance.

* The first far infrared spectrum to be measured of an object outside the solar system was obtained on an Ames Lear Jet at 45,000 feet using a Michelson interferometer attached to a 30 cm telescope pointed at the Orion Nebula.

* Ames scientists participated on the Mariner Mars TV team which produced the first close up pictures of the Martian satellites, Deimos and Phobos.

* The Concorde SST aircraft was simulated on the FSAA to develop certification criteria and to evaluate failure modes and abuse conditions that one would not want to conduct in flight on a prototype aircraft. This was a joint NASA/FAA program in conjunction with both British and French governmental agencies and companies. The program culminated with Ames research pilot, Fred Drinkwater III, participating in a Concorde flight.

heat pipe experiment

* The Ames Heat Pipe Experiment (AHPE) was launched aboard the Orbiting Astronomical Observatory (OAO-C) and is providing confidence

based on flight proven performance for the future use of passive variable conductance heat pipes in major thermal control applications.

Space Shuttle

Note: Ames has continued to contribute strongly to development of the Space Shuttle as demonstrated by the following achievements:

* Unpowered space shuttle approaches and landings were simulated from an altitude of 39,000 feet using the Convair 990 with engines at idle. Both automatic and manual approaches and landings were successfully completed.

* A new program has started that will translate Ames experience in conducting airborne scientific missions into the operation of the Shuttle in the sortie mode. In this mode, the Shuttle will carry groups of scientific investigators and their experiments into space to make observations of the earth and astronomical objects. As part of Ames program, a mission was recently flown with a Lear Jet airplane to simulate in realistic manner some of the constraints that will be imposed on Shuttle experimenters.

* For the first time, the flow-field network over the entire Space Shuttle orbiter has been numerically calculated permitting the prediction of heat transfer and shock-wave intersections during the reentry phase of the shuttle flight.

* Wind tunnel tests to determine the effects of rocket motor jets plumes on the aerodynamic performance of the Space Shuttle ascent configuration have been made in the Unitary Wind Tunnel using jets of cold gas at high pressure to simulate the actual plumes; within NASA, only Ames has this test capability.

tilt rotor

* A joint NASA/Army program was initiated for the development of a tilt rotor research vehicle. Contracts were awarded in October to two companies for a 3-month detail program planning and design study to be followed by selection of a single contractor for completion of design and fabrication of two aircraft. The vehicles will be used in a flight research program at Ames to provide verification of the tilt rotor concept for quiet, short-haul VTOL air transportation for military and commercial use.

* Phase B design study contracts were let in 1972 for an additional Pioneer program - Pioneer Venus - to explore and study the Venusian atmosphere.

FAA Office

* An FAA Office was established at Ames with Mr. J. Cayot as Director, to pursue joint programs, to evaluate handling qualities and to determine certification criteria for STOL aircraft.

* Dr. Irving C. Stotler was appointed as Director of the Ames Directorate of the Army Air Mobility Research and Defense Laboratory.

* Lt. Col. Richard E. Kahler was appointed Chief of the Air Force Systems Command Liaison Office at Ames.

* The probable beginnings of photosynthesis on earth, about 3.3 billion years ago, have been discovered in rocks from South Africa by a team of Ames and UCLA scientists.

Annual Ames Children's Christmas Party



At the Annual Ames Children's Christmas Party, Dec. 16, the Center said Happy Holidays to the sons and daughters, grandsons and granddaughters of employees.

Along with the traditional candy, cookies, balloons and gifts, lively entertainment was provided by Ed Kelley, RSM, and his handmade marionettes. Special new features this year included a small circus and a muppet show.

The drawing for grown-up presents resulted in the following:

Kodak camera, projector and screen, Cal Dodson, RFTM; Panasonic TV, Rodney Bailey, F; ten-speed bike, Roland DeConti, FAOE; portable refrigerator, John Lawson, RFR; man's watch, Burt Smith, RFTM; lady's watch, Fred Moore, PAF; gift certificate, Jerry Barrack, FPS; binoculars, Maxwell Blanchard, SSP; vacuum cleaner, Earnest Ransted, FAOW; rotisseris, Merle Hartzell, RSC; G.E. radio, Edward Inn, SSE; back-pack, Kenneth McKinzie, FAOW; electric knife, Tom Canning, PS; fondue cooker, Louie Rondoni, RSM.

Door prizes went to; Barbara German, a fire extinguisher; and Lyndell King, FAA, a Parker pen and pencil set.

All surplus prizes were given to the Santa Clara County Children's Shelter and the Agnew Mental Hospital. Both agencies were very grateful to the employees of Ames.

Sal Tardio, chairman of this year's party, extends a note of appreciation to the following committee chairmen:

Janice K. McMillin, LTB, refreshments; Jeraldine Mazzurco, LXE, refreshments; Kathi Vitiello, APT, Gingerbread House and the

Gift Houses; Fred Tucker, AAP, Hangar set-up; George Grant, RFD, Gift House, Pat McFarland, Gift House; Guy V. Ferry, SSP, clowns; Barbara J. German, APM, Balloon Girls.

A special thanks goes to Santa Claus (two of them) and Mrs. Claus; Forrest E. Gowen, STP, and Bruce F. Smith, SSS, and Darlene Moen, DI.

MBA orientation program

Two televised orientation programs for employees interested in the Golden Gate University MBA Program have been scheduled as follows:

Place - building 241, room 145A (television classroom)

Date - Jan. 10 and Jan. 11

Time - 12 - 1 p.m.

Channel - 3

A description of the overall program, the admissions requirements, and enrollment procedures for all interested employees will be given.

Further information and a schedule of ACE courses are available in the Ames Training Office, building 241, room 138.

First Aid course

A course for instructors in First Aid, which will help qualify participants to teach or belong to a ski patrol unit, is being offered at Ames.

It will begin Jan. 23, 1973 and end March 6, meeting Tuesdays and Thursdays from 7 p.m. to 10 p.m. in building 241, room 147-9. An Advanced First Aid Certificate is a pre-requisite.

For information contact John Habermeyer at ext. 5602 or Sheri Coats at 322-2143.

JOGGERNEWS

... by Jerry Barrack

The Joggernews' special physical fitness program began on Dec. 1 with the majority of members faithfully logging the miles come rain, snow, and cold winds. Paul Sebesta has set the pace and reached the 100-mile milestone on Dec. 14, averaging over 7 miles per day.

On Dec. 3, Bruce Castle, Jerry Barrack, Vito D'Aloia, and Dale Shute ran the Livermore Valley 8.56-mile run sponsored by the Livermore Valley Running Club and the Radiation Laboratory Recreational Association. The course began at the Radiation Laboratory, went up into the rolling foothills, and finished where it started. The day was perfect for running, cool and overcast.

Jerry set a fast sub-6 minute mile pace for the first two miles, but could not hold Bruce off in the hills. Out of the 208 finishers, Bruce came in 72 (55:03), Jerry 81 (55:36) Vito 103 (58:21) and Dale 156 (65:36).

Thank You

Curt Cooper, the employee who is collecting Betty Crocker coupons for a kidney machine, sent the following note of thanks:

"Many thanks to you all for your very kind and immediate response to the Astrogram article. The coupons from Ames will make a big difference to this collection drive. Again, thank you,

Curt Cooper"

BOWLING

... by Kay Bruck

The last game of the 1972 Ames Golf Club was held at Laguna Seca on Dec. 2. The winners of two flights as reported by Chairman Ed Stepnoski were:

First Flight - Jack Lee, 1st.; Joe Quartuccio, 2nd; and Vance Oyama, 3rd.

Second Flight - Earl Menefee, 1st; Bert Nevotti, 2nd; and 3rd and 4th were taken by Paul Kutler and Jim Nelan.

The annual Ames Golf Club Award and Installation Dinner for new officers will be in January. Watch for announcement of date and place.

The schedule for 1973 has been completed and will be printed on the back of the membership cards. Membership in the Ames Golf Club is open to all Ames and support contract employees. Anyone interested in joining may do so by contacting Clark White, Treasurer, ext. 5438. Initiation fee is \$2 and the annual dues are \$4.

WANT ADS

The Astrogram's ad section is provided as a personal, non-commercial service to Ames employees. Advertiser must be identified by name, extension and organization. must be submitted in writing to The Astrogram, mail stop 241-4, by Wednesday, a week before publication. The advertiser's home telephone number must be provided as a point of contact except in car-pool notices. Ads must be limited to 15 words or less.

FOR SALE

Polaroid camera, model 230 w/ cold clip, devel., timer & flashgun, \$110 value for \$65. 321-1858.

Tap shoes, size 6, like new, \$6. 321-1858.

Recording tape, Scotch Dyna. series, #203, 1/4 x 1800" reel, never used \$5, call 321-1858.

Bathroom vanity w/ gold veined marble top, \$50/best offer, call 248-2115 after 4 p.m.

Ampex tape recorder, series 1000, reel to reel, asking \$75, call 277-5307.

Canon F-1 SLR camera w/ wide angle & telephoto lenses, Barrack, 263-2195.

Orig. oil paintings, make nice gifts, call 734-3368 after 5 p.m.

Used G.E. wall oven, brown, \$25, 851-1906.

Refrigerator/freezer \$150, Larry Russel, 252-8316.

Shot gun case, 42" length, used once, \$5, Debby DeBevoise, 948-5602.

Accordian, 120 bass, like new, cost over \$400. Sell for \$175, call 997-1357.

Safety Office moves

The Ames Safety Office moved from building 241 to building A201 recently. It's new mail stop is 201-7.

Individual room and phone numbers are as follows:

John G. Habermeyer, Chief of the Safety Office, room 17A, extension 5602.

John E. Hewitt, Radiation Safety Officer, room 16, extension 5604.

Hilda Montano, Secretary, room 17, extension 5602 or 5604.