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

NASA

The Astrogram

VOLUME XVIII NUMBER 21

July 1, 1976

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

Women's news: brown bag lunch

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

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

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

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

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

"The Viking search for life" -see page 2

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

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

Restaurant choice and menu:

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

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

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

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

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Speaker – Charles H. Kruger

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The remaining topics will be printed in the next issue.

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

"The Viking search for life"

(Continued from last issue)

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

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

Pyrolytic Release Experiment

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

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

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

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

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

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

Labeled Release Experiment

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

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

Gas Exchange Experiment

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

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

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

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

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

The Experiments Compared

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

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

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

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

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

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

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More Golf news

Tournament chairmen Earl Menefee and Contrad McCloskey report the following winners for the Ames Golf Club Tournament at Aptos Seascape Golf Course on June 12, 1976:

First flight: 1–L. Hockstein, 2–O. Koontz, 3–R. Hedlund, 4–J. Lee.

Second flight: 1–P. Quattrone, 2– B. Kelly, 3–R. Richardson, 4–J. Cayot.

Third flight: 1–A. Joly, 2–A. Lopez, 3–E. Levin, 4–R. Oyama.

Fourth flight: 1–R. Dowell, 2–B. Quattrone, 3–Y. Shaeffer, 4–F. Demuth.

Scuba club

The Ames Scuba Club will meet on July 14, 1976, in the Ames Cafeteria dining room. The meeting will begin at 12:45 and be over by 1:30. The program for this meeting will be a movie on diving in the Gulf of Mexico.

Late bulletin

The results of the NASA Intercenter Postal Jogging Competition are in!!! Headquarters with 68.5 points overall came in first with Ames chasing close behind with 62.0 overall points. Competition was particularly stiff in the Men's 30–39 age category. Hoever, Ames scored a First Place victory in the women's 29 and under age category with Agnes Berta's time of 13:59.

The winning time for the 2-mile course was 10:19 posted by Humes at Langley in the 30–39 Men's age category. The second best time was 10:24 in the 40–49 Men's age category (Waco, LaRC) and the third best time was 10:33 in the under 30 Men's age category (Merhault, JPL).

This first competition brought out 161 men and 10 women with Ames having the most participants – 36.

Because of the enthusiastic response, this competition will be held twice yearly with a different Center sponsoring the event. Ames will sponsor the next competition in mid-October 1976. So get out your jogging shoes and let's be first in October.

"Thank you"

I am back to work, after having open heart surgery, identical to the one that was published in the section of Mercury News – "California Today" in the May issue. I am feeling better than I have in quite some time. Weather permitting, I ride a bike 5 miles every day.

I want to thank all my friends who sent me cards and flowers and did a little praying for me.

Thank you,
Sal Tardio

To all my friends at Ames:

I wish to express my sincerest thank you for the lovely retirement party and luncheon you gave me on May 26th and for the fine gifts presented to me. My family insists I mount the large poster pictures so the initial job for the wood-working tools is set.

Again, thanks and best wishes to all of you.

George Annand

ARA ACTIVITIES

ARA STORE – The ARA Store in the Cafeteria will be open 3 days a week during the summer; Mondays, Wednesdays and Fridays from 12:00 to 12:45 p.m. for your shopping convenience.

DISCOUNT CARDS – Discount cards for Great America and Marriott Corp. facilities should be available in *about* 3 weeks from now at the ARA Store. We also have a large selection of other discount cards for entertainment areas in California.

CLUB NEWS – For those of you who are not aware of the many different sports and recreational activities available to both Ames and contractor personnel, here is a list of the ARA-supported clubs and their presidents. Please contact them for details on their club's activities, meetings, etc.:

CLUB	PRESIDENT	EXT.
All-Ames Basketball	Frank Steiner	5850
Ames Sportsmen's Club	G. E. Peterson	6022
Ames Fastpitch Softball	Bruce Ganzler	5943
Industrial Basketball	Paul Kutler	6417
Ames Scuba Club	David Boze	5319
Ames Golf Club	Ruben Ramos	5913
Joggernauts	Bruce Castle	5089
All Ames Bowling League	Glen C. Carle	5766
Ames Ski Club	Jack Tunnell	5262
All Ames Summer Bowling	George Rathert	5168
Ames Mixed Fives Bowling League	Daniel N. Petroff	6260
Ames Intramural Softball	Bill Pitts	6615
Ames Photography Club	Joseph Licursi	6161

GOLF CLUB NEWS – The Ames Golf Club will have their Awards Banquet July 16th at the Fairbrae Swim and Racquet Club, Sunnyvale. Members and their guests are invited. Tickets are $6.50 per person and include open bar and Filet Mignon dinner with wine. Call Ruben Ramos, Ext. 5913 by July 9th for reservations.

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29 & under	Agnes Berta	13:59
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Ames Merit Promotion Plan vacancies

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76-121	Research Assistant (Amends closing date only)				7-14-76
76-126T	Supervisory Space Scientist	GS-14/15	SSG	NASA-wide	7-26-76
76-127T	Supervisory Aerospace Engineer	GS-14/15	SPT	NASA-wide	7-26-76
76-128T	Engineering Technician (GO)	GS-5/7/9	FLI	Centerwide	7-12-76
76-129T	Computer Aide/Technician	GS-4/5	FAX	Centerwide	7-12-76
76-130T	Research Aircraft Mechanic (Crew Chief)	WG-14	FOX	Centerwide	7-12-76
76-132T	Secretary (Typing) or Secretary (Stenography)	GS-4/5	LTI	Centerwide & Outside	7-12-76

TO APPLY: Call Extension 5599 or 5600.

MERIT PROMOTION PLAN SELECTIONS

Notice No.	Title	Org.	Name
76-97	Research Aircraft Mechanic – 2 positions	FOS	Gale LeVan and Louis Russo
76-112	Wind Tunnel Mechanic Shift Leader	FSA	Arthur Morris

Want ads

Transportion

FOR SALE: 1960 MGA1600, strong engine, new transmission, needs some body & interior work, $1000 – firm. 245-8746.

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FOR SALE: 1963 Pontiac Catalina, runs well. A good work car. $300. Call Clint, after 6 p.m. Ph. 265-7018.

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FOR SALE – 1970 Honda Trail 70, 1300 miles, good condition. $185. 493-6841 after 5 p.m.

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FOR SALE: *Engine* Chevrolet SS 396. 56,000 mi. Exc. cond. Chrome valve covers, etc., includes 4 barrel carb., smog pump, distributor, all in exc. working order. Use for car, truck, or power boat. Make offer. 968-5682, evenings.

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FOR SALE: 1976 Harley Davidson 250SS, orange with sissy bar. Under 500 miles, only 4 weeks old. Excellent condition. $900. 996-1789, after 5 p.m.

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MOTORBIKE – Vespa, very good condition, only 1000 miles – $200/offer. Call 968-3808.

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FOR SALE: Honda 450cc, '73, 8K miles. Excel. cond. $800/offer. John, 985-1792.

Housing

Available in July, 3 bdrm home, Milpitas area, $250, partial furn., Cheryl, 263-5983.

SUBLET: Nice studio apt., furnished, modern, all electric, small patio, pool, near NASA (Rengstorff Ave., 2 blk from 101). Available: July 10 to Sept. 10 (nego.) Rent: $150/mo. Call Bijan at ext. 6539.

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HOUSE FOR RENT: 4 bedrooms, 1-1/2 bath, drapes, stove, dishwasher, convenient to freeway and schools. Sunnyvale, $375 and deposit. Phone: 732-2357 after 6 p.m.

– – – – –

TAHOE CITY TOWNHOUSE, pool, tennis, sauna, fireplace, color TV, phone, washer/dryer, all electric kitchen, snack bar. Sleeps 6–8. Reserve now for summer. P. DeRamo, (415) 685-1220 evenings.

– – – – –

House for Rent. W. J. McCroskey, 493-8554.

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FOR RENT: 3 bdrm, 2 bath home in a nice neighborhood in Los Altos. Patio, fireplace, large family room, convenient to shopping and freeways. Available Sept. 1, $475. R. Munoz, 941-3589.

Pajaro Dunes – 2 B/R, 2 BA, Beachfront condo. Sleeps 6. Waterbed, tennis. $250 wk. $95 wknd. 325-5103.

Miscellaneous

Ride or carpool wanted. Bascom & Fruitdale, San Jose. 7:30 to 4:00. Schillerstrom, ext. 5119.

Raquetball Membership – for Supreme Court in Sunnyvale, 1/2 price. Dick Gemoets, 245-7808 aft. 6.

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Curtains, off-white, 260 x 94 (pair), 150 x 98 (pair), 100 x 98 (single panel) custom-made, heavy duty, good cond. Will last forever, clean, all for $200/make offer. Can sell separately. Call: 321-1858.

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LUDWIG DRUMSET – Excellent condition, all hardware, cymbals, $200/offer. Call 739-9124. No answer, call 968-3808.

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FOR SALE: Canopy double bed, desk and night stand, $175. Phone: 732-2357.

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FOR SALE: Smith Corona Electric Typewriter, $50. Woman's 3 speed bike, exc. condition, $35. Mamiyasekor 500 TL F2 SLR Camera with 135 mm Telephoto and auto 2X converter, exc. condition, $125. Call 964-5867 after work.

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FOR SALE: Hammond Organ, model L100. Leslie Tone Cabinet, model 122. Used very little. $1100. 246-9311.

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FOR SALE: Double box spring & frame; Danish teak bed with mattress & attachable night stands; large Naugahyde lounge chair & ottoman. All excellent. Char-Broil barbecue wagon, never used. 941-3336.

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FREE: Beautiful german shepherd with loving disposition free to good home. Female, AKC. 252-8609.

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FOR SALE: 1973 Tent-trailer, Starcraft Galaxie, sleeps 8. Exc. condition, extras. $1950. 961-3804.

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BIKES FOR SALE: Boys 20", 5-speed, hand brakes, Sears – $35. Girls 20", single speed, Huffy – $25. Girls 20", single speed – $7.50. Boys 20", single speed – $7.50. 867-4845 after 12 noon.

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WANTED: Carpool to and/or from University & Middlefield. Hours flexible. Am blind and cannot drive, will therefore share expenses. Ext. 5249 or 328-2112.

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FOR SALE: Life Raft; 6 man, transom plate, plywood floor, bellows pump, oars & air cushions – $110. Stereo: Magnavox walnut console – $75. Barbecue: 24" hood, spit, etc. – $7. 252-5596.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

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More Golf news

Tournament chairmen Earl Menefee and Contrad McCloskey report the following winners for the Ames Golf Club Tournament at Aptos Seascape Golf Course on June 12, 1976:

First flight: 1–L. Hockstein, 2–O. Koontz, 3–R. Hedlund, 4–J. Lee.

Second flight: 1–P. Quattrone, 2– B. Kelly, 3–R. Richardson, 4–J. Cayot.

Third flight: 1–A. Joly, 2–A. Lopez, 3–E. Levin, 4–R. Oyama.

Fourth flight: 1–R. Dowell, 2–B. Quattrone, 3–Y. Shaeffer, 4–F. Demuth.

Scuba club

The Ames Scuba Club will meet on July 14, 1976, in the Ames Cafeteria dining room. The meeting will begin at 12:45 and be over by 1:30. The program for this meeting will be a movie on diving in the Gulf of Mexico.

Late bulletin

The results of the NASA Intercenter Postal Jogging Competition are in!!! Headquarters with 68.5 points overall came in first with Ames chasing close behind with 62.0 overall points. Competition was particularly stiff in the Men's 30–39 age category. Hoever, Ames scored a First Place victory in the women's 29 and under age category with Agnes Berta's time of 13:59.

The winning time for the 2-mile course was 10:19 posted by Humes at Langley in the 30–39 Men's age category. The second best time was 10:24 in the 40–49 Men's age category (Waco, LaRC) and the third best time was 10:33 in the under 30 Men's age category (Merhault, JPL).

This first competition brought out 161 men and 10 women with Ames having the most participants – 36.

Because of the enthusiastic response, this competition will be held twice yearly with a different Center sponsoring the event. Ames will sponsor the next competition in mid-October 1976. So get out your jogging shoes and let's be first in October.

"Thank you"

I am back to work, after having open heart surgery, identical to the one that was published in the section of Mercury News – "California Today" in the May issue. I am feeling better than I have in quite some time. Weather permitting, I ride a bike 5 miles every day.

I want to thank all my friends who sent me cards and flowers and did a little praying for me.

Thank you,
Sal Tardio

To all my friends at Ames:

I wish to express my sincerest thank you for the lovely retirement party and luncheon you gave me on May 26th and for the fine gifts presented to me. My family insists I mount the large poster pictures so the initial job for the wood-working tools is set.

Again, thanks and best wishes to all of you.

George Annand

ARA ACTIVITIES

ARA STORE – The ARA Store in the Cafeteria will be open 3 days a week during the summer; Mondays, Wednesdays and Fridays from 12:00 to 12:45 p.m. for your shopping convenience.

DISCOUNT CARDS – Discount cards for Great America and Marriott Corp. facilities should be available in *about* 3 weeks from now at the ARA Store. We also have a large selection of other discount cards for entertainment areas in California.

CLUB NEWS – For those of you who are not aware of the many different sports and recreational activities available to both Ames and contractor personnel, here is a list of the ARA-supported clubs and their presidents. Please contact them for details on their club's activities, meetings, etc.:

CLUB	PRESIDENT	EXT.
All-Ames Basketball	Frank Steiner	5850
Ames Sportsmen's Club	G. E. Peterson	6022
Ames Fastpitch Softball	Bruce Ganzler	5943
Industrial Basketball	Paul Kutler	6417
Ames Scuba Club	David Boze	5319
Ames Golf Club	Ruben Ramos	5913
Joggernauts	Bruce Castle	5089
All Ames Bowling League	Glen C. Carle	5766
Ames Ski Club	Jack Tunnell	5262
All Ames Summer Bowling	George Rathert	5168
Ames Mixed Fives Bowling League	Daniel N. Petroff	6260
Ames Intramural Softball	Bill Pitts	6615
Ames Photography Club	Joseph Licursi	6161

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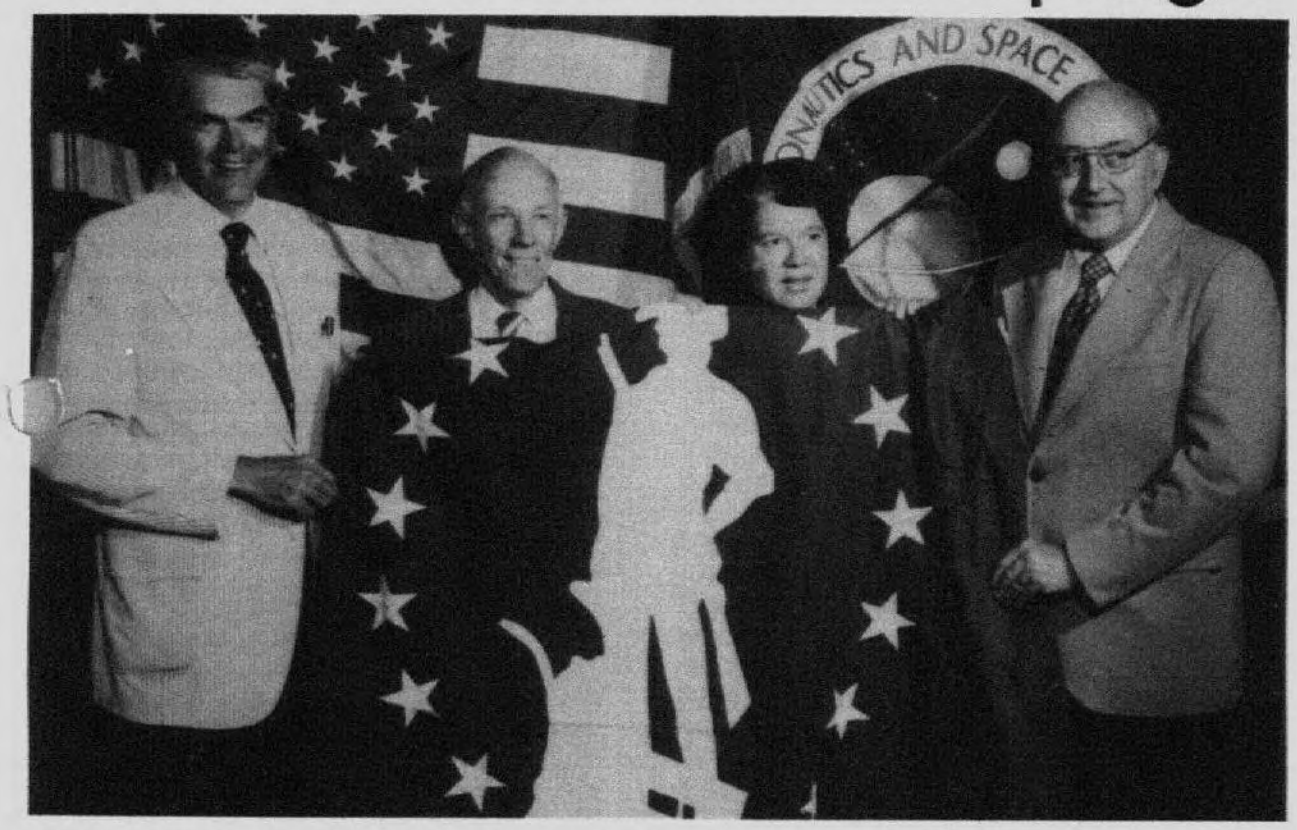
NASA

The Astrogram

VOLUME XVIII NUMBER 22 July 15, 1976

Ames receives Minute/man Flag for successful Bond campaign



Pictured are Dr. Mark, G. Allan Smith, Ames Bond Coordinator, Mari Ann Weigel, Calif. State Director of the Treasury Dept.'s U. S. Savings Bonds, and C. A. Syvertson with the Minute Man Flag.

The enthusiastic efforts of Ames' 1976 U.S. Savings Bond Drive Chairman Dr. G. Allan Smith have culminated in the award of the U.S. Treasury Department's Minute Man Flag to ARC.

The flag is given each year to federal agencies who boast of at least 75% participation in U.S. Savings Bond drive and to private companies who have 50% participation. Both Center Director Dr. Hans Mark and Deputy Director C. A. Syvertson recently expressed their sincere appreciation for the tremendous effort Dr. Smith displayed in his coordination of the '76 bond campaign. Dr. Smith raised ARC's participation rate to a level never before reached; the timing during this bicentennial year was certainly significant.

The success, cited by Dr. Smith, was certainly the result of the team efforts of a number of individuals. One key member of the team was John Giboney of the Financial Management Division who maintained the records and submitted the weekly reports to Headquarters. He was strongly supported by his Division Chief, Ralph Shawlee, by Helen Bolt, chief of the Pay and Travel Branch, and by the staff of the payroll section – Mary Campbell Houston, Dorothy Hicks, Corazon Licerio, and Eleanor Holt who transcribed the pledge cards and prepared the new deduction allotment schedules. The bill board posters and charts in the cafeteria were designed by Marianne Rudolph of the Graphics and Exhibits Branch. They were installed by Ronald Lippard of the carpenter shop. The special issue of the Astrogram was prepared by Meredith Moore and included pictures taken by Lee Jones of the Phototechnology Branch. An essential contribution to the success of the drive was the strong support of Center management as indicated by the pictures in the Astrogram of 30 division and office chiefs who attended the organization meeting. Particular support was given by C. A. Syvertson who took a strong interest in the campaign and encouraged these division leaders to bring their organizational participation to a high level.

Bradley named to management post at Dryden

Ann Bradley, Assistant Executive Officer to the Deputy Administrator of NASA, will become Director of Administration and Management Support at Hugh L. Dryden Flight Research Center, effective July 18.

In her new role, Bradley will be responsible for administrative and management support of operations at the center, including the shuttle carrier aircraft tests and the orbital approach and landing tests for which extensive preparations are now underway. Specifically, these responsibilities include financial management, procurement, personnel management and institutional support.

Bradley joined NASA in 1973 as a personnel management specialist in NASA Headquarters. From September 1974 to June 1975, she attended Princeton University through NASA's Executive Development Program as a Princeton Fellow in Public Affairs in the Woodrow Wilson School. When she returned from Princeton last year, she became Executive Assistant to Dr. George Low, Deputy Administrator of NASA.

Before coming to NASA, Bradley was employed by the Office of Economic Opportunity and the Agency for International Development as a Personnel Management Specialist.

She is a native of Washington, D.C., where she attended McKinley High School. She has a Bachelor of Science degree in Administration from George Washington University, and pursued graduate level studies at Princeton University.

Lovelace nominated NASA-Deputy Director

President Ford recently announced his intention to nominate Dr. Alan M. Lovelace of Severna Park, Md., as Deputy Administrator of the National Aeronautics and Space Administration.

Lovelace, 46, is currently NASA's Associate Administrator for Aeronautics and Space Technology, where he has served since September 1974.

Lovelace has held various research management positions in the U.S. Government since joining the Department of Defense in 1954.

He served at the Air Force Materials Laboratory, Wright-Patterson Air Force Base, Ohio, from 1954 through 1972. He was named Director of that Laboratory in 1967. From 1972 to 1974 he served as Director of Science and Technology with the Air Force Systems Command, Andrews Air Force Base, Washington, D.C. From October 1973 to September 1974 he also served as Acting Deputy Assistant Secretary of the Air Force (Research and Development).

Awards received by Lovelace include the Air Force Decoration of Exceptional Service (1973); the National Civil Service League Career Service Award (1971); the Office of Aerospace Research Award for Outstanding Contributions to Research (1970); the Air Force Association/Air Force Systems Command Meritorious Award for Program Management (1969); the Air Force Commendation for Meritorious Civilian Service (1959); the Flemming Award (1958); and the AFML Charles J. Cleary Award (1956).

Author of numerous technical papers, Lovelace is a member of the American Institute of Aeronautics and Astronautics, Sigma Xi, American Men and Women of Science, Phi Beta Kappa, National Academy of Engineering, the Air Force Association and is a Fellow of the American Astronautical Society.

Born in St. Petersburg, Fla., Lovelace holds bachelors, masters and doctorate of philosophy degrees in chemistry from the University of Florida.

Reading volunteers needed

There are thousands of students in the United States who would not get an education except for a vital "fourth R." These are the blind and handicapped students who depend upon a nonprofit organization called Recording for the Blind.

The San Francisco Peninsula Unit of Recording for the Blind is now in need of people who can read math, computer science, and other technical subjects.

Most of the classic literature and a great deal of history have already been recorded over the years that RFB has been serving blind students nationally, but the requests coming in now are often for highly technical science and engineering texts.

Volunteer readers must pass a reading test, but dramatic talent is not a requirement, just the ability to read intelligibly. Most volunteers come in once a week to record at a ninety-minute session at the RFB studio, located at 499 Charleston Road, Palo Alto. For further information call Recording for the Blind, 493-3717.

State of the Center address

by Hans Mark

Some of you may have wondered why I did not make my annual report to you, as usual, at the end of February this year. As you know, that date was the anniversary that marks my joining you here at Ames seven years ago. The reason is that we could not use the auditorium at the time since we were in the middle of the remodeling process. The explanation is as simple as that. So, I am happy to welcome you all to the new auditorium and to make this occasion the first one for which we shall use this beautiful new room.

I must confess to you, however, that it is just as well that I was not able to report to you on the state of the Center in February. I would have been forced to make a very dismal report. The twelve months from February 1975 to February 1976 was a period during which we suffered an almost unbroken series of setbacks. Two of these had to do with our failure to get two important "New Starts" into the current budget, the NASA/Navy Lift-Fan Aircraft and the upgrading of the 40 by 80 Wind Tunnel. In addition, the manpower reductions assigned to Ames for FY 1977 left us losing more than we gained in the assignment of roles and missions to the NASA Centers. A major loss was the Pioneer Program, which will be terminated after the completion of Pioneer Venus. For some time during the negotiations about Pioneer Venus last year there was talk of transferring the program away from Ames even before its completion. In Aeronautics, work related to long-haul aircraft, especially in the area of supersonic inlets and internal aerodynamics, was terminated. As many of you know, we have long had a strong program in that area which is now gone. In space research we are being forced to phase out most of our work in planetary geology, and several other smaller programs will also be terminated or cut back.

All of these programmatic factors showed up in a very negative way in that the reduced manpower ceilings assigned to Ames for the coming years were much lower than we had expected them to be. What made the situation even worse is that these manpower reductions were based on roles and mission assignments that we ourselves had initiated some three years ago. What happened was that while some Centers, specifically the Jet Propulsion Laboratory and the Langley Research Center, made some gains in the roles and missions assignments at our expense, we did not make any compensating gains that I could have talked about last February. At that time, several crucial issues were still to be decided that affected Ames in a vital manner and, thus, the situation looked very bleak to say the least.

It might be worthwhile here to say a word about roles and missions. I know this has been a subject of some discussion at the Center recently and I would like to take this opportunity to make my own position clear. More than three years ago, in January of 1973, we suggested to NASA's senior management that clear roles and missions be assigned to all the NASA Centers. We felt that this would be necessary in the face of continuing pressures on NASA to reduce its in-house manpower. These manpower reductions did indeed materialize in the subsequent year and NASA's response was the "Institutional Assessment" that was conducted late in 1975. As a result of this assessment, roles and missions were assigned to the various NASA Centers in a much more systematic way than had ever been attempted before. I am convinced that given the continuing budget problem that NASA will have to contend with, the correct approach is to do precisely what we have done. With continuing in-house manpower reductions, there is simply no way each NASA Center can be a "little NASA" and operate successfully in the broadest possible range of programs. What each Center must do is to concentrate on what it can do best and to develop programs around these strengths. The technical community, the customers for our technology, and NASA Headquarters must serve as the ultimate judges of whether we have correctly assessed these strengths. I realize that well defined roles and missions assignments may very well limit some of the things that we want to do, but under current circumstances this simply cannot be helped. My own assessment is that the roles and missions assignments should not limit some of the very small things we may want to do that are somewhat outside our assigned roles and missions, but there is no doubt that we will have to be guided by our assigned roles and missions with respect to the larger program decisions that we will have to make.

In my address to this group two and a half years ago (in March 1974) I spelled out six areas – we called them "areas of emphasis" at the time – in which we intended to lead. These areas were Short-Haul Aeronautical Technology, Flight Simulation, Computational Fluid Mechanics, Planetary Entry Technology and Planetary Atmospheres, Airborne Sciences, and the Life Sciences. Roughly speaking, the assignments of roles and missions during the "Institutional Assessment" were reasonably consistent with these choices. Unfortunately, it is not possible, given our limited time, to deal with each of these topics in detail. I hope that during the course of the next year we will have further discussions in smaller groups where this can be done. However, I believe it is important that I mention two decisions that have been taken by NASA Headquarters since February which have had a very significant and favorable impact on our prospects for the future. Also, I want to mention briefly a significant event, the forthcoming Viking Landing, that will have an important impact on our future work in the Life Sciences.

In the field of Short-Haul Aviation Technology, a decision was reached three weeks ago to designate Ames as NASA's lead Center for research and development in helicopters. As many of you know, we had vigorously argued that the assignment of the major role we did get in Short-Haul Aviation would be meaningless without the helicopter assignment as well. I am pleased to report to you that Dr. Fletcher, Dr. Lovelace, and the other people involved at NASA Headquarters in reaching the final decision eventually agreed with the arguments that we made. I should hasten to add, however, that the decision must still be implemented in the coming months, and I am certain that this will not be easy. Nevertheless, I believe we have taken an extremely significant step in rationalizing NASA's Aeronautical Research and Development Programs. It is now up to us to make it work.

The second decision was the one by the Office of Space Sciences which led to the assignment of the responsibility for the construction of the infrared telescope for the Infrared Astronomical Satellite to Ames. This work will be performed in support of the Jet Propulsion Laboratory which has been assigned the overall project management responsibility. Although infrared astronomy is not, in my view, a really proper topic for a Center "role" because it is too narrow in scope, it was, nevertheless, an important decision for us in view of its future implications. At the present time Ames has only a very tenuous grasp on any Shuttle payload. Infrared astronomy is an exception and there is reason to believe that the expertise we have developed in this field through our experience in the airborne telescope led to the assignment that has been made in the case of the Infrared Astronomical Satellite. This assignment now gives us the opportunity to transfer some of the experience we have gained in the airborne sciences operation eventually to the Shuttle for which we hope to receive the assignment to build an infrared telescope as well.

These decisions have both alleviated the very serious consequences of the manpower reductions that were assigned to Ames during the "Institutional Assessment." It is too early to give an accurate accounting of just what the magnitude of the favorable impact will be because some of the final decisions regarding manpower assignments to Ames as a result of the acquisition of these programs remain to be made. However, there is no doubt that they will go a long way toward balancing the very painful manpower cuts for fiscal years 1977 and 1978 imposed on last year. I should make it clear however, that none of these decisions affect fiscal year 1976 reduction-in-force of fifty Civil Service positions currently planned for this summer which must be concluded by September 30 of this year.

In the Life Sciences we will in a few weeks witness the culmination of one of our major efforts. The landing of the Viking Spacecraft on Mars will give us mankind's first opportunity to see whether the processes that led to the advent of life on Earth occurred on another world as well. Those of you who are involved in this enterprise can be proud indeed of being associated with this effort. However, the completion of the Viking Mission means that we must make realistic and, hopefully, bold new plans to continue our work to search for life or evidence of life elsewhere in the Universe. In another area of the Life Sciences, we are working hard to understand the minimum medical selection criteria for passengers that will be flying on the Shuttle. We believe this work will ultimately be of crucial importance because taking people to orbit is by far the most important unique feature that the Shuttle possesses. This point is being recognized more widely now in the more recent plans being generated by the people at NASA Headquarters to make provisions for flying relatively untrained people on the vehicle. We have just carried out a reorganization of our Life Sciences Directorate that will, hopefully, make the organization more effective in carrying out some of these functions.

I could say much more about the state of affairs in various programs, but I believe that the ones I have mentioned are the highlights. I would now like to turn to a brief discussion of some of the things that may be in store for us in the future. I should make it clear that I am expressing my own opinions here and that, as usual, these will be subject to vigorous debate as the Center's programs evolve. I believe that we will have to keep five salient points in mind during the coming year.

1. In spite of some of our recent gains, I believe that in the long-term Civil Service manpower assigned to NASA will continue to decrease. These decreases will not be aimed only at NASA, as they have been sometimes in the past, but rather at the Government service in general. As long as "Big Government" is perceived to be a danger by the people and by some of our important political leaders, we will have to face this situation. Even though it is becoming ever more evident that NASA

State of the Center address *(Continued)*

is not an unpopular organization and that people generally may not perceive us as being part of "Big Government," I am afraid we shall not be exempt from further cutbacks. A major consequence of this situation will be that the pressures for more clearly defined roles and missions will continue. However, in spite of this situation, I believe that public service is still a rewarding career and that we will be able to perform very important technical work.

2. It is absolutely essential that we continue our policy of developing the closest possible relationships with the customers of our technical work. Not only is this the right thing to do, it is also the best thing to do from the point of view of narrow self-interest. I am personally absolutely convinced that we could not have prevailed in our arguments at NASA Headquarters in the debate over the helicopter program were it not for our strong relationships with the U.S. Army Air Mobility Laboratory located at Ames. We must continue to develop this relationship and to expand our efforts to work with the Army, the Navy, the Air Force, the Federal Aviation Administration, and other agencies that have use for our technology. There is no doubt in my mind that this is absolutely essential.

3. The assignment of well defined roles and missions to the NASA Centers means that we will have to develop new ways of working with other Centers. We will no longer have the independence that we have had in the past and we will, in many cases, have to learn how to play subordinate roles in various technical programs. For example, we will be supporting the Jet Propulsion Laboratory in the Jupiter Orbiter Program to develop the Jupiter entry probe. I have every reason to believe that we will be able to develop proper relationships with JPL in order to perform this job successfully. By doing this we will be able to continue the brilliant reputation that has been established by the people working on previous Pioneer Programs. In the case of the Infrared Astronomical Satellite, we also will be supporting the Jet Propulsion Laboratory. There will be a number of programs where we will be supporting Langley in aeronautics and the Johnson Space Center in some Shuttle related work. I have had lengthy discussions with all of the Center Directors involved in these programs and I am optimistic that we will be able to work out effective methods to support other Centers, since all of the Center Directors involved thoroughly understand the problem and the conditions that are creating the situation I have described.

4. The major problem we face in the next few years will continue to be how Ames will best fit into the NASA family when Shuttle flights begin to dominate NASA's operations. As I have already mentioned, I continue to believe that the most important function of the Shuttle will be to carry people, rather than automated payloads, since this is what is truly unique about the vehicle. We must see if we can develop some programs to fit with that theme. I must admit to you at this time I do not know precisely how this can best be accomplished. Accordingly, we have established a team to study the question in depth and make some recommendations on this very important matter during the coming months.

5. Finally, the most important of all, we must, and we will, continue to do high quality technical work. The essence of doing this is to start by asking questions and by looking at issues that are genuinely important. In Aeronautics, for example, there is no doubt that Vertical Take-Off and Landing vehicles will play a central role in meeting future defense requirements of the Nation. Some of you may have seen the British television documentary on the Soviet Navy the other day which showed, in a very objective and understated way, the vast expansion of the Russian fleet that has taken place in the last decade. I believe that this situation speaks for itself and there is no doubt in my mind that we can have a major impact on our national defense position in our work with the U.S. Navy to develop new VTOL aircraft. The search for extraterrestrial intelligent life is a genuinely important cultural and scientific question. Through the dedicated efforts of a number of people at Ames, we have been able to excite the interest of some of the best scientific and technical talent in the country to work on this problem. We have also been designated as NASA's lead Center in the area and I expect that in the coming years we will develop an interesting program to conduct such a search. In computational fluid mechanics I believe that we are on the threshold of some genuinely new discoveries in the theory of turbulence. I have just completed a review of this work and I am most pleased to report to you that I am enormously impressed by what has been achieved already and by what seems to be achievable in the near future. Another significant achievement is the establishment of the Aircraft Safety Reporting System. This program is being conducted jointly with the Federal Aviation Administration and the essential idea is to make very thorough examinations of procedures used by commercial aircrews in actual operating situations. Given the different organizations involved, it was very difficult to develop a meaningful program, but I am pleased to report that such a program is now in existence and there is every reason to believe that we will be able to make important contributions to public safety through this effort. Finally, no list of achievements for this past year would be complete without mentioning our work in developing the Thermal Protection System for the Space Shuttle Vehicle. As you probably know, the Orbiter Project Office at the Johnson Space Center has recently selected the Ames developed high temperature coating for use on the Orbiter's Thermal Protection System. This decision is the best possible evidence I can think of to demonstrate the continued competence of our technical efforts in this very important field. There are many other examples of special achievements, but unfortunately I cannot list them all. Suffice it to say that our challenge is to continue to enhance the quality of our work and our future will be assured.

It might be worthwhile for me to close by saying a few words about NASA. I have been a member of this organization now for seven years, so that I can begin to speak with some little authority on the subject. What makes NASA interesting is that it has a function which runs counter to much of the popular philosophy that has been with us in the past five years. In that period, the dominant thinking in this country has been preoccupied with our physical and political limitations. Every time we open a newspaper we read stories about scarce natural resources, depleted oil supplies, and further insults to the natural environment. Our political leaders speak of an "era of limits." This school of thought has obtained considerable intellectual respectability and indeed there have been influential organizations such as the "Club of Rome" that have made the recognition of limitations the centerpiece of their thinking.

I believe that limit-orienting thinking of this kind is very dangerous. Obviously, at any given time there are limits that must govern our short-term plans, but it is a fundamental mistake to believe that these limits are permanent. Even a cursory reading of history teaches us otherwise. If we abandon the notion of long-term growth and development, if we believe that the pie is ultimately finite, then the only possible political form that will survive is authoritarianism. In a world that is perceived to be permanently finite, someone must have the power to divide limited resources among the world's people on a permanent basis. This is the real fallacy of the "Zero Growth" notion: The human imagination is not finite and as long as Man is free to imagine, he will grow and develop. He will seek to transcend the physical and intellectual limits that seem to constrain his horizons. What is important to me about NASA, and what makes me proud to belong to this organization, is that it is precisely our task to remove physical limitations. In Aeronautics, it has been NASA's (and the NACA's) character for over half a century to develop technologies that have already freed man from many of the geographic limits that once bounded his activities. The same is even more applicable to our work in the exploration of space where we have not only sent men on entirely new ventures, but have also opened new vistas in science and technology. I am firmly convinced that the exploring spirit in us is more deeply lodged than people are willing to admit. It is this which accounts for the popularity of the proposals that have been made of Professor Gerard O'Neill and the fact that we can now credibly say that all people can, in one way or another, participate in this new exploratory enterprise.

There is no doubt in my mind that we in NASA have a strong future. We habitually take the long view and this allows us to overcome the daily difficulties that we face. I am also convinced that we at Ames will be in a position to take advantage of the many opportunities that the future presents for us. I am still, now after seven years, very pleased and honored to be here with you, and I'm happy to have the opportunity to work with you all.

Thank you.
Hans Mark

ARA ACTIVITIES

DAY AT THE RACES – The ARA will once again feature a "Day At the Races" at Bay Meadows August 7, 1976. Price per ticket is $9 which includes admission, buffet lunch in the Turf Club and program. Tickets (while they last) may be obtained by contacting Judy Long, Bldg. 227, Room 204, Ext. 5874.

FRONTIER VILLAGE – The ARA will sponsor an Ames evening at Frontier Village, Friday, July 30, 1976 from 5 to 10 p.m. Tickets are available at the ARA store every Monday, Wednesday, and Friday from 12:00 to 12:45 p.m. Price of $2.50 includes entrance fee and unlimited rides.

FUTURE PLANS – Mark the following dates on your calendar and watch for further announcements for a special Ames evening at Santa Cruz Boardwalk August 13 and at Great America September 17. Tickets will be at reduced price.

HAPPY HOUR – The next Happy Hour is Friday, July 23rd, sponsored by the Ames Jet Setters.

Ames Merit Promotion Plan vacancies

Notice No.	Title	Grade	Org.	Area of Consideration	Closing Date
76-133T	Clerk-Typist or Procurement Clerk (Typing)	GS-3/4 GS-4/5	ASR	Centerwide & Outside	7-23-76
76-134T	Procurement Clerk or Procurement Assistant	GS-4/5/6	ASE	Centerwide & Outside	7-23-76

TO APPLY: Call Extension 5599 or 5600

MERIT PROMOTION PLAN SELECTIONS

Notice No.	Title	Org.	Name
76-104	Supv. AST Experimental Facilities & Equipment	RFE	Allan Bakke
76-105	Budget Assistant (Typing) GO	AR	Patricia Jones
76-109	AST Experimental Facility Techniques	FLI	Arthur D. Jones
76-114	Research Aircraft Mechanic	FOS	Gerard Bree

Jetsetters news

23 July – HAPPY HOUR sponsored by the Jetsetters. Come learn more about the "Mini Tours" available from California Host and meet or renew friendships with the hosts and hostesses who have been accompanying our trips.

20 August – WINE AND DINE CRUISE.

Typewriter element repairs

Broken elements for selectric typewriters and MTST composers can now be repaired. This service covers any of the following: broken teeth, cracked element, broken hubs, tops, lever, cap, or spring.

Fill out a purchase request and forward to Jessie Mosher (M/S 241-1), keep element until you are phoned. Cost is $7.95 versus $18.00 for a new element.

Want ads

Transportation

FOR SALE: 1972 HONDA CL350 motorcycle, under 1000 mi, $450. Call 255-3794.

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CAR FOR SALE: 1970 Ford Maverick; excellent condition; new clutch and rebuilt transmission; radio and heater; 2 door; 3 speed. 65,000 mi; $1200 or make offer. Call Cardy Macon, 266-8362 after 6 p.m.

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FOR SALE: '70 Cougar, P.S., new tires, excel. cond., offer. 964-0852 after 6 p.m.

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Model "A", 1929 Closed Cab Pick-Up. Many extras and new parts included. Body work on cab and frame almost completed. Engine runs but not now assembled. $1500 or best offer. L. Enfield, (408) 259-7158.

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FOR SALE: 1974 Volkswagen "Super Beetle." Bought new/12,000 mi; beige w/brown interior; AM-FM Stereo w/speakers; additional 50,000 mi warranty; automatic "stick shift"; call 578-3742 after 6 p.m.

– – – – –

1970 Volkswagen Squareback, good condition. Leaving country, must sell, $900 or best offer. Phone: 965-8957 after 5 p.m. Mr. Thibert.

– – – – –

1974 MUSTANG, excel. cond., very low mileage, 4 cylinder, 4-speed manual transmission, red with white interior, $2750. Call George Lenehan, 343-9730.

Housing

FOR SALE– 3BR, 2BA House in Cupertino, semi-custom construction, FP, carpeted over hardwood floors, large exceptionally landscaped lot with covered patio and brick BBQ, on quiet street close to all schools and near 2 bus lines. $49,950. Call 257-6541, Chet Shapero.

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HOUSE FOR RENT – SUNNYVALE
SPARKLING CLEAN – 3 Bdrm, 1 Ba, double garage, fireplace, large yard with patio and barbeque, fruit trees, appliances. 3 miles to NASA. $350 mo., 248-9733.

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HOUSE FOR RENT: 3 bedroom, 2 baths, carpets, drapes, dishwasher, covered patio, sprinkling system, nice neighborhood, convenient to freeway and schools. Sunnyvale, $390. Phone 739-4844.

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FOR RENT – 3 bedroom, 2 bath house, Cupertino area, 2 car garage with shop. area. All electric kitchen, near elementary school and library, great for family. Call 493-1936, $380 mo.

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Visiting professor needs to rent small furnished home in Los Altos vicinity, Sept. 76–July 77. Will provide yard care. Ralph Bach, 948-3716 (home), 965-5429 (office).

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HOUSE FOR RENT: Furnished 3 bedroom, 2 bath house in Los Altos. Includes a family room, AEK, 2 fireplaces, washer, dryer, dishwasher. Available on lease – Sept. 76–June 77. NO PETS. Rent $625/mo. Includes gardener and water. Cupertino School District. Large yard. Contact: Lee Neidleman, (415) 961-5672, eve. and wkends.

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FOR RENT: 3 bdrm, 2 bath home in a nice neighborhood in Los Altos. Patio, fireplace, large family room, convenient to shopping and freeways. Available Sept. 1, $475, R. Munoz, 941-3589.

Miscellaneous

FOR SALE: Doghouse for large dog, construc[illegible] tongue-in-groove redwood siding with asphalt roof. Used one week, $25. Sunnyvale, 245-6411.

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FOR SALE: Baby crib with spring & mattress, Danish teak slot couch. Call 736-6947 after 5 p.m.

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WANTED: Driver to join existing car pool near Ortega Park in Sunnyvale. Phone ext. 5298, 5537, or 739-4844.

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2-Dunlop-SP4-165 SR14 Radial – Very good tires. $50. 1 Uniroyal Radial 175-SR13, good, $5. Call 257-1847.

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TWO SAILBOATS: 1. C-15, trapeze, race rigged, measured, extra sail and boards, $1500. 2. El Toro, fiberglass by Moore, race rigged, and measured, $350. John Broderick, 739-1475.

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Will the person or persons who borrowed two l[illegible] pots from the Ames cafeteria kitchen please [illegible] them to Mr. Claude Kieth (Chef). Thank you, Sal Tardio. P.S. For all employees' information, "we" the Ames Exchange Council furnish these utensils for that kitchen!!

– – – – –

SORE FEET AND BROKEN BACKS!!
Would the person who removed the SPERRY equipment cart from Bldg. 210 (S-19 Simulator) please return same to SPERRY OFFICE bldg. 210, rm. 220. No questions will be asked. NASA has no funds to replace. W. Urban

– – – – –

WANTED: Carpool to and/or from University & Middlefield. Hours flexible. Am blind and cannot drive, will therefore share expenses. Ext. 5249 or 328-2112.

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On Thursday, August 5, a film on Hypothermia (Mountain Sickness or Death by Freezing) will be shown in the auditorium (Bldg. 200) at 12 noon.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

The Astrogram is an official publication of the Ames Research Center, National Aeronautics and Space Administration, Moffett Field, California, and is published bi-weekly in the interest of Ames employees.

Editor . . . . . Meredith Moore
Associate Editor . . . . Marcia Kadota
Reporters . . . . . NASA Employees

Deadline for contributions: Thursday between publication dates

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National Aeronautics and Space Administration

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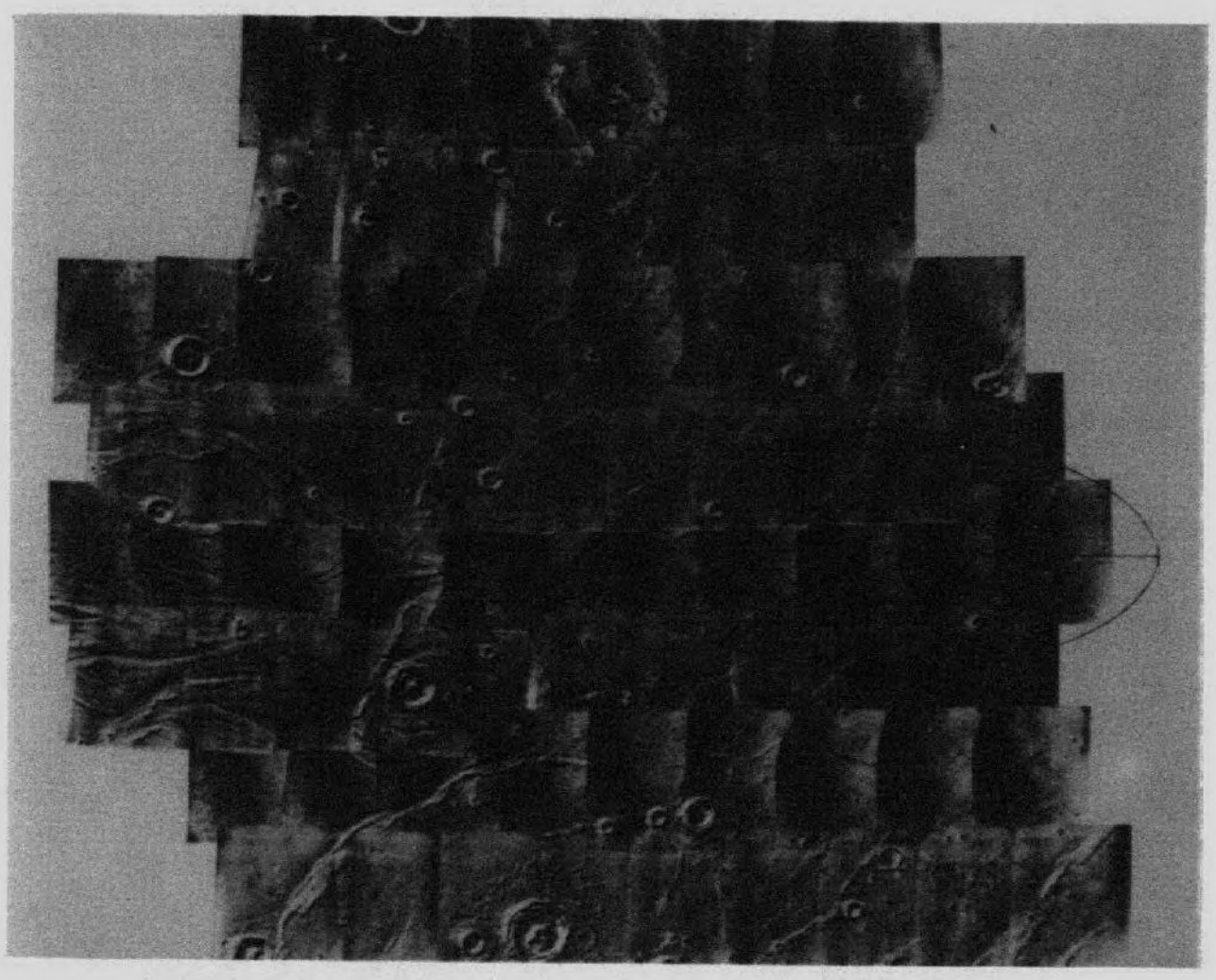
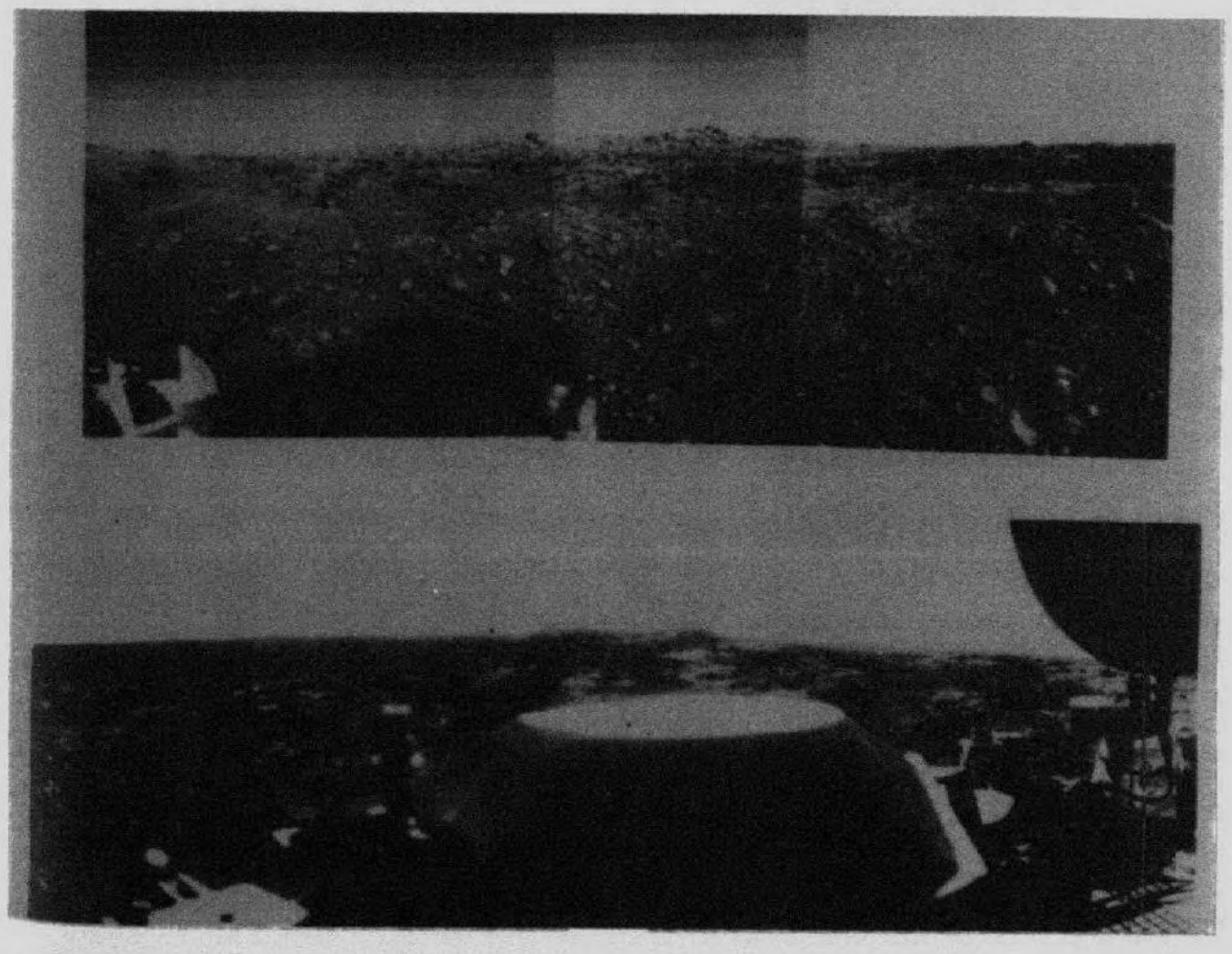
The Astrogram

VOLUME XVIII NUMBER 23 July 29, 1976

Successful landing on Mars for Viking 1





Upper left

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

Lower left

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

Rossow earns recognition

Vernon J. Rossow recently received a Professional Achievement Citation in Engineering from his alma mater, Iowa State University at Ames, Iowa. Rossow is currently a staff scientist with the Large Scale Aerodynamics Branch here at the Center.

Rossow's career began in 1949 at NACA-Ames in the Supersonic Free Flight Branch. He later joined the Theoretical Aerodynamics Branch which in time became the Computational Fluid Dynamics Branch. In 1972 he moved into his present position.

Rossow's entire career has been with NACA and NASA: he has worked in fluid mechanics, aerodynamics and electro magnetic phenomena. His research has contributed to the success of the space program and to the improvement of the conventional aircraft design and performance. He has published nearly 45 papers.

Rossow earned a B.S. in Aeronautical Engineering from Iowa State University, an M.S. from the University of Michigan, and a doctorate from the Swiss Federal Institute of Technology.

Star gazing tour

Want to look through a telescope at the summer night sky?

Want to have a tour of the "Kuiper Flying Observatory," otherwise known as the Ames C-141 aircraft?

Want to learn about the airborne infrared astronomy program at Ames?

You can do all of these on Friday evening, August 6th, during a cooperative program between Ames and the San Mateo Astronomical Society.

Robert Cameron, Chief of the Medium Altitude Applications Branch (formerly Airborne Science Office) will begin the evening's activities by presenting an overview of the C-141 and its role as a flying observatory; his presentation will be at 7:30 p.m. in the newly-remodeled Ames Auditorium (Building 201). Following Cameron's presentation, the audience will walk to the C-141 Hangar for a tour through the flying observatory.

After the tour, the group will return to the vicinity of the Auditorium where members of the San Mateo Astronomical Society will have set up some of their telescopes. Ames employees and guests will have an opportunity to look through several different telescopes and view nebulas, galaxies, and the Milky Way including M-13 (a star cluster of 100,000 suns).

All vehicles and visitors will be entering Moffett Field through the Main Gate. Therefore, the names of all non-badged family members and friends who want to attend any portion of the evening must be processed in advance of the evening. Please phone the names (and country of citizenship if not the U.S.) to the Educational Programs Office, extension 6364, no later than Tuesday afternoon, August 3.

C-8 to become a QSRA

Pictured above from left to right are John Cochrane, ARC's Project Manager of the Quiet Short-Haul Research Aircraft (QSRA); Tom Twiggs, Pilot, Boeing Commercial Airplane Company; and Bob Innis, Research Pilot, ARC and QSRA Project Pilot. The C-8 aircraft appears in the background. Innis and Twiggs recently flew the aircraft to Seattle where it will undergo extensive modifications and become the QSRA. The first test flights are scheduled in Seattle in the Spring of 1978; the airplane will then be delivered to Ames in the summer of 1978.

The QSRA staff includes the following people: Front row – John Cockrane, QSRA Project Manager; Bob Price, Mike Shovlin, Dennis Riddle, Dennis Brown, Pat Hallett, Jack Farrar, Peter Patterakis, Al Kass, Bob Innis, Tom Twiggs. Back row – Howard Turner, Al Boissevain, John Weyers, and Jack Ratcliff. Not pictured is NASA Resident Manager Bob McCracken.

Chinese dinner

GOURMET CHINESE DINNER

Place: The Golden Pavilion – Los Altos (Just south of the Cabana)
Date: Saturday, August 7
Time: 6:45 p.m. No-Host Cocktails
7:45 p.m. Dinner
Cost: $8 per person, including tax and tip

Cutoff date August 3, 1976. Call Guy Wong, ext. 6022, for reservations.

Menu: Cocktail Hour Hors D'Oeuvres:
1000 Year Eggs w/Pickled Ginger
Fried Won Tons

Shredded Coriander/Sesame Chicken
Half Moon of Neptune in Chicken Broth
Braised Duck with Chestnuts
Mo Shu Pork w/Thin Rice Pancakes
Peking Beef Ring
Szechuen Pepper Chicken
Kwor Ba Prawns
Steamed Rice
Cookies – Tea

National Aeronautics and
Space Administration
Ames Research Center
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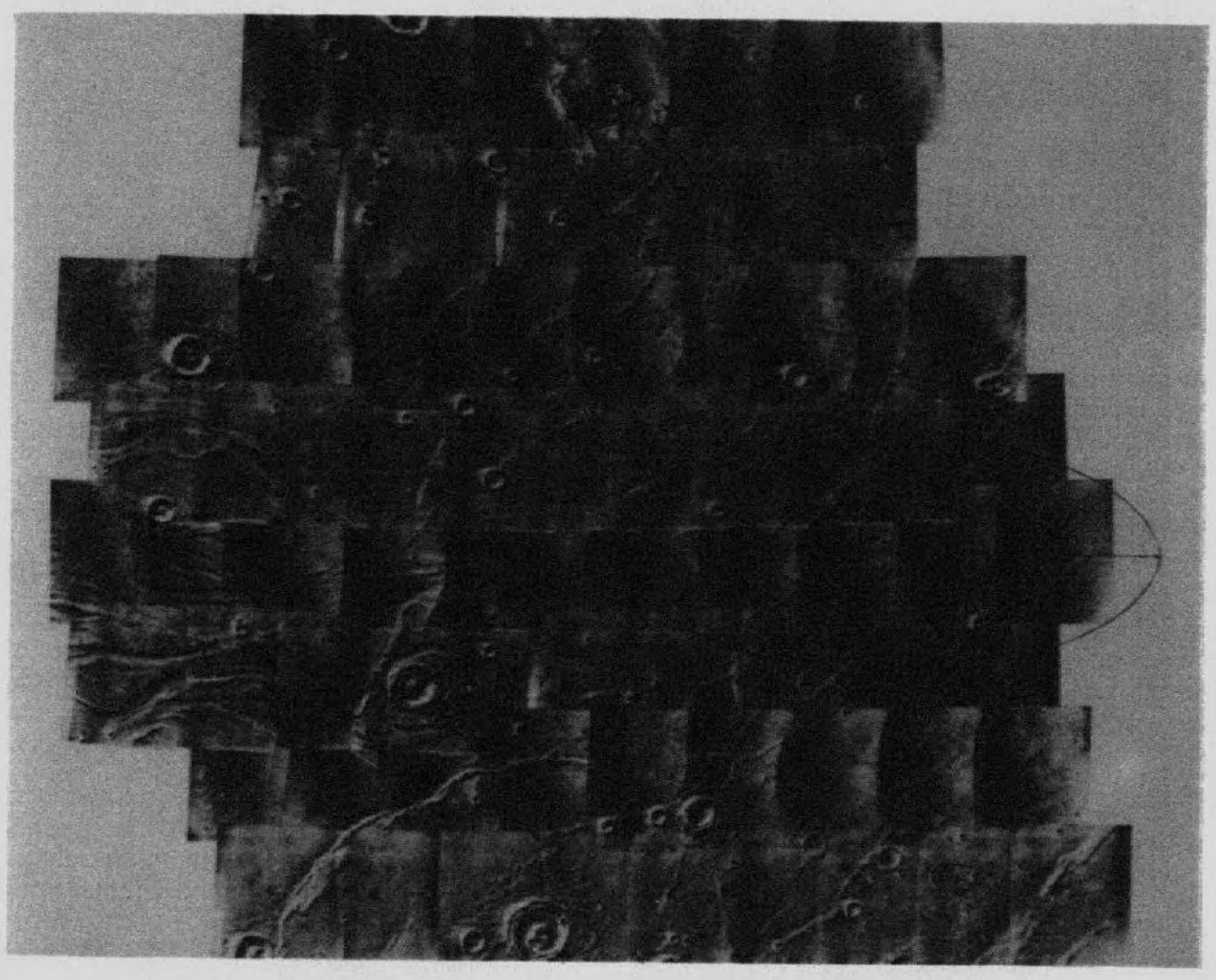
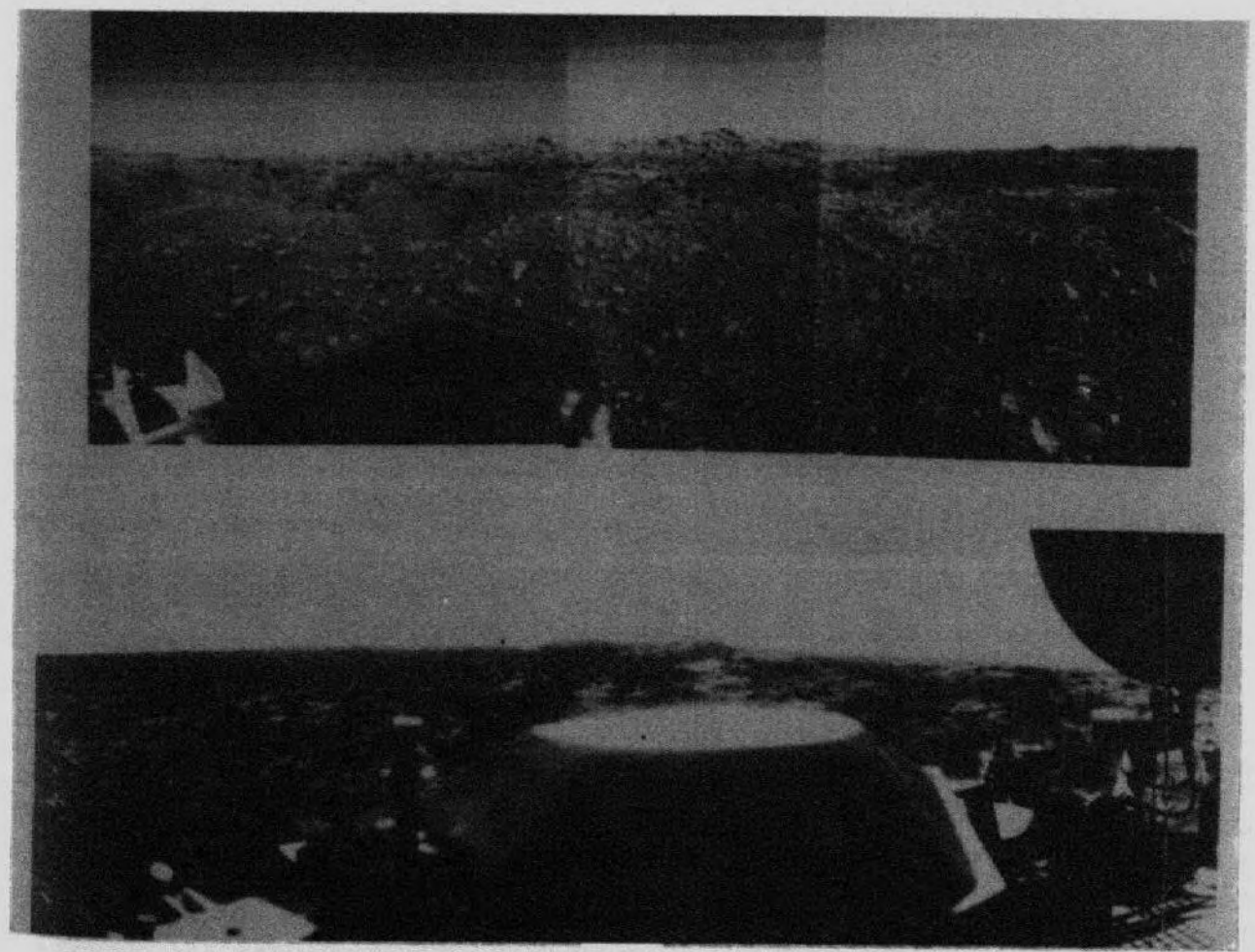




Upper left

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

Lower left

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

Rossow earns recognition

Vernon J. Rossow recently received a Professional Achievement Citation in Engineering from his alma mater, Iowa State University at Ames, Iowa. Rossow is currently a staff scientist with the Large Scale Aerodynamics Branch here at the Center.

Rossow's career began in 1949 at NACA-Ames in the Supersonic Free Flight Branch. He later joined the Theoretical Aerodynamics Branch which in time became the Computational Fluid Dynamics Branch. In 1972 he moved into his present position.

Rossow's entire career has been with NACA and NASA: he has worked in fluid mechanics, aerodynamics and electro magnetic phenomena. His research has contributed to the success of the space program and to the improvement of the conventional aircraft design and performance. He has published nearly 45 papers.

Rossow earned a B.S. in Aeronautical Engineering from Iowa State University, an M.S. from the University of Michigan, and a doctorate from the Swiss Federal Institute of Technology.

Star gazing tour

Want to look through a telescope at the summer night sky?

Want to have a tour of the "Kuiper Flying Observatory," otherwise known as the Ames C-141 aircraft?

Want to learn about the airborne infrared astronomy program at Ames?

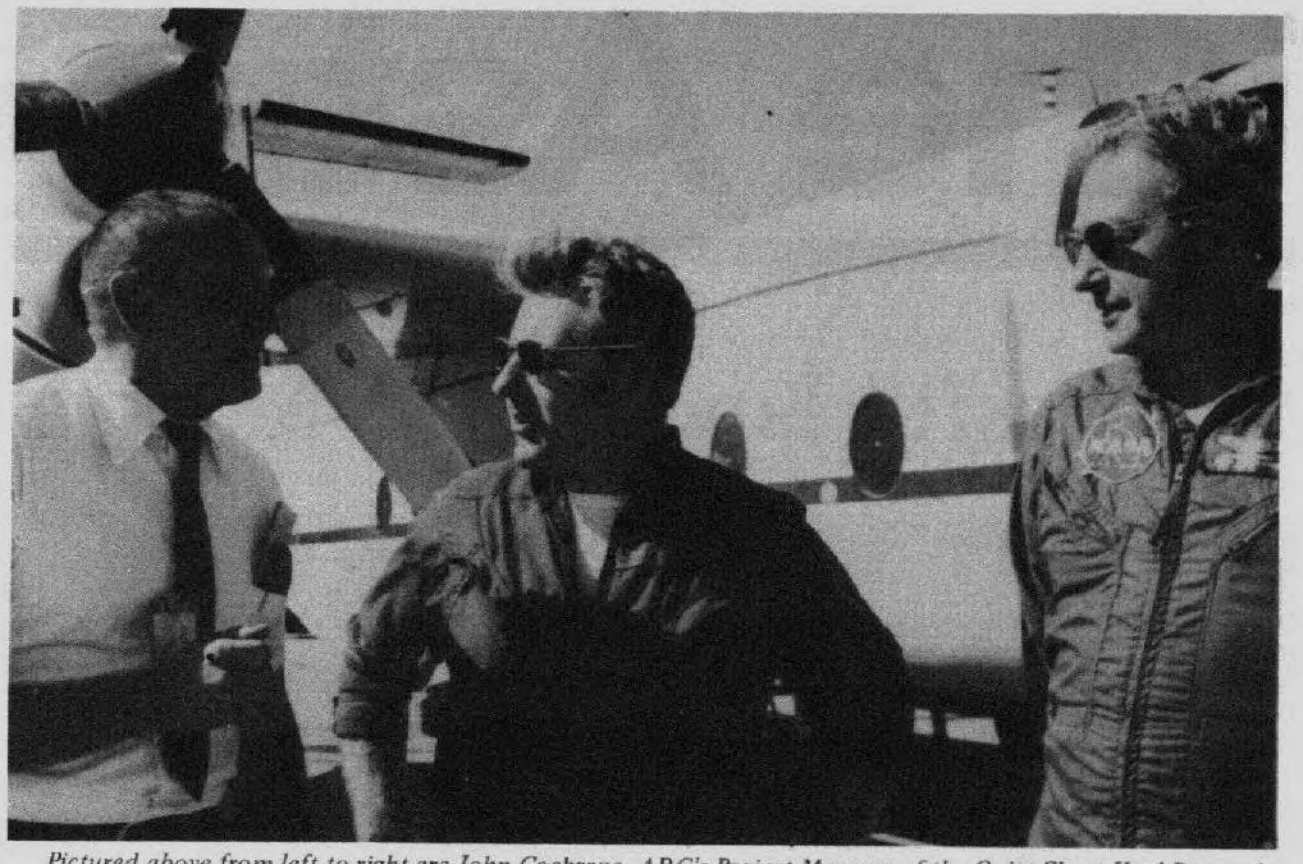
You can do all of these on Friday evening, August 6th, during a cooperative program between Ames and the San Mateo Astronomical Society.

Robert Cameron, Chief of the Medium Altitude Applications Branch (formerly Airborne Science Office) will begin the evening's activities by presenting an overview of the C-141 and its role as a flying observatory; his presentation will be at 7:30 p.m. in the newly-remodeled Ames Auditorium (Building 201). Following Cameron's presentation, the audience will walk to the C-141 Hangar for a tour through the flying observatory.

After the tour, the group will return to the vicinity of the Auditorium where members of the San Mateo Astronomical Society will have set up some of their telescopes. Ames employees and guests will have an opportunity to look through several different telescopes and view nebulas, galaxies, and the Milky Way including M-13 (a star cluster of 100,000 suns).

All vehicles and visitors will be entering Moffett Field through the Main Gate. Therefore, the names of all non-badged family members and friends who want to attend any portion of the evening must be processed in advance of the evening. Please phone the names (and country of citizenship if not the U.S.) to the Educational Programs Office, extension 6364, no later than Tuesday afternoon, August 3.

C-8 to become a QSRA



Pictured above from left to right are John Cochrane, ARC's Project Manager of the Quiet Short-Haul Research Aircraft (QSRA); Tom Twiggs, Pilot, Boeing Commercial Airplane Company; and Bob Innis, Research Pilot, ARC and QSRA Project Pilot. The C-8 aircraft appears in the background. Innis and Twiggs recently flew the aircraft to Seattle where it will undergo extensive modifications and become the QSRA. The first test flights are scheduled in Seattle in the Spring of 1978; the airplane will then be delivered to Ames in the summer of 1978.

The QSRA staff includes the following people: Front row – John Cockrane, QSRA Project Manager; Bob Price, Mike Shovlin, Dennis Riddle, Dennis Brown, Pat Hallett, Jack Farrar, Peter Patterakis, Al Kass, Bob Innis, Tom Twiggs. Back row – Howard Turner, Al Boissevain, John Weyers, and Jack Ratcliff. Not pictured is NASA Resident Manager Bob McCracken.

Chinese dinner

GOURMET CHINESE DINNER

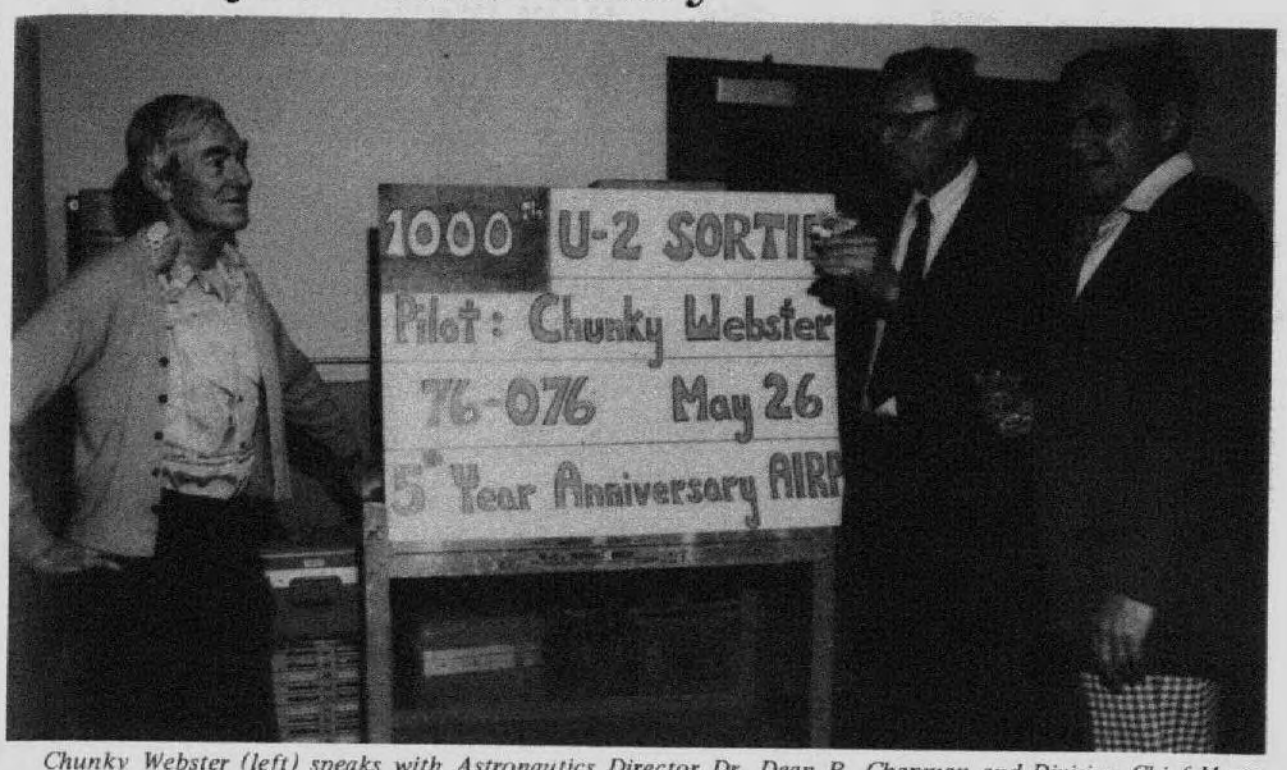
Place: The Golden Pavilion – Los Altos (Just south of the Cabana)
Date: Saturday, August 7
Time: 6:45 p.m. No-Host Cocktails
7:45 p.m. Dinner
Cost: $8 per person, including tax and tip

Cutoff date August 3, 1976. Call Guy Wong, ext. 6022, for reservations.

Menu: Cocktail Hour Hors D'Oeuvres:
1000 Year Eggs w/Pickled Ginger
Fried Won Tons

Shredded Coriander/Sesame Chicken
Half Moon of Neptune in Chicken Broth
Braised Duck with Chestnuts
Mo Shu Pork w/Thin Rice Pancakes
Peking Beef Ring
Szechuen Pepper Chicken
Kwor Ba Prawns
Steamed Rice
Cookies – Tea

U-2 5-year anniversary



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Gene and May Rosen

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Mrs. Vernon E. Nicholson and Family

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Chloroform (also called trichloromethane) is one of a series of chlorinated hydrocarbons selected for carcinogenesis bioassay, based on their occurrence in the general and occupational environment of humans. Chloroform was included in this group because of its chemical structure and its extensive use, and because of earlier suspicions of carcinogenicity.

Most chloroform used in the United States is for manufacturing fluorocarbons for refrigerants, aerosol propellants, and plastics. It is also used in extracting and purifying antibiotics, as an industrial solvent, in photographic processing and industrial drycleaning, in dyes, drugs, and pesticides, and in some toothpastes, cough medicines, liniments, and salves. The chemical was used in the past as an anesthetic.

Study results, NCI scientists concluded, clearly indicate that chloroform has induced liver cancers in mice, and kidney tumors in rats. The findings are considered definitive for animal studies and serve as a warning of possible carcinogenicity in humans. However, the extent of possible human risk cannot be predicted reliably on the basis of these studies alone.

Copies of the chloroform report and additional information are available from the Office of Cancer Communications, NCI, Bethesda, Maryland 20014.

The National Cancer Institute is a bureau of the National Institutes of Health, one of six agencies of the U.S. Public Health Service.

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76-124	Secretary (Steno) Secretary (Typing)	LX	Vera Buescher

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– – – – –

For Sale: '69 Pontiac, Catalina. Needs brakes. $500/best offer. Phone: 257-9604.

– – – – –

Plymouth, Valiant, '74, radio & heater, 3 speed, 6 cyln., 21,700 miles, $2300. 253-7945.

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'69 Dodge Dart, 4-door sedan, good condition. Leaving country, must sell by Aug. 30. $800 or best offer. Call 964-7566 after 6 p.m. Goto.

– – – – –

'72 36' Swanee Houseboat, twin 120 H.P. w.I.O., sleeps 6, nice condition, $14,500. Paul Jolissaint, home: 294-8350.

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FOR SALE: '69 V.W. Bug, 10,000 miles on new engine, 1600 cc, excellent condition. $1200. 961-1270 after 6 p.m.

– – – – –

'72 Toyota Corolla 1600 Station Wagon. I'm moving. $1200. Paulk, 779-5965.

Housing

FOR SALE: 3 Bedroom, 2 bath, 2 car garage, family room, dining room, AEK, fireplace, w/w carpets, drapes, near Hollenbeck & Knickerbocker, Svale. Assumable 7% GI loan. Price at $64,950 – 735-9029.

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1 Bedroom apt., 1838 W. Bayshore, Palo Alto. Furnished or unfurnished, w/w carpeting, laundry room. Call 967-7672.

HOUSE FOR RENT: Furnished 3 bedroom, 2 bath house in Los Altos. Includes a family room, AEK, 2 fireplaces, washer, dryer, dish washer. Available on lease: Sept. 76 – June 77. NO PETS. Rent $585/month. Includes gardner and water. Cupertino School District. Large yard. Contact: Lee Neidleman, (415) 961-5672 evenings and weekends.

– – – – –

3 Bedroom, 2 bath house in a 1/3 acre parklike setting with fireplace, large family room, and patio. Quiet neighborhood in Los Altos. 10 min to Ames by freeway. Available Aug. 15, $475 per mo., 941-3589.

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For Rent: 3 bedroom house near Los Altos High School and convenient to shopping. Extra large livingroom, fireplace, and patio suited to container gardening. Available Sept. 1. $375 per mo. 941-3589.

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Hywy 88 – 4,000 ft elev – 3 hrs from Bay Area, 1 acre with livable unfinished chalet. Panoramic view, private 1 mile road off Hywy 88. 1 bdrm, loft, deck, 1½ baths. 40 min to Kirkwood Ski. 3 yr old, $26,500 firm. (415) 826-5243.

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Furnished home, Los Altos, available during August, $300. Call R. Bach, 948-3716.

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Rental – Cabin S. Lake Tahoe, sleeps 8, 2 baths, T.V., telephone, fireplace, call 225-8043.

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Home for sale by owner: 4 bedrooms, 2 baths, separate family room w/fireplace. Superb landscaping w/sprinkler systems. Fruit trees, storage building in rear. Many other extras. $68,950. Owner will finance. For appointment call 255-6340.

Miscellaneous

WANTED: Carpool to and/or from University & Middlefield. Hours flexible. Am blind and cannot drive, will therefore share expenses. Ext. 5249 or 328-2112.

FOR SALE: Camper Shell: 36 in. Aluminum w/ sliding glass windows. Full back door, for short wide bed. $50. 735-9029.

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FOR SALE: (1) Radar Range – Amana, new. Will sell for $300. Call 734-4468 anytime. (2) Maytag Washer – excellent condition. $50. 734-4468.

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For Sale: Girls 3-speed bicycle. Black. Very good condition. $30. Ted Weber – 408-356-7388.

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Wht/gold bedroom set. Twin poster bed, mattress & box springs, double dresser, powder table, desk, bedside table. All matching, hardly used. BARGAIN at $200 (firm). 964-7062 eves.

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Guinea Pigs, male, FREE. 253-4475.

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FREE KITTENS. Long-haired and very cute. Call after 5 p.m. 946-1654. Rick, Ruth or Steve.

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Two solid Salem maple end tables. Full double tiered, 19" wide, 28" long, 26" high, flawless. $40 each. Two table lamps, brass with green glass, $20 each. Call 867-5982.

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Gemini House: Resale Boutique – Ladies Apparel – Novelties, 2383 Pruneridge Ave., Santa Clara, phone 241-1007.

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Hanging lamp made of shell chip, ball type. $5, phone 246-9766.

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Toy Collie (Sheltie) Pups, sable & white. 4 female, 2 male, AKC, shots, avail 7-31-76. $75–$100. 245-0327 (eves).

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Wanted in good condition: a 10" or 12" tricycle and a card table. Call 245-0666.

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WANTED: Room for rent, or apt. to share, near Univ. of Santa Clara. Want to rent during school year. I need a place to live. Contact Cathy Huber, 493-6854.

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Fourth driver for 8–4:30 carpool from Saratoga Village Center. Phone: 867-3794.

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WANTED: Would like to improve my sign language – need someone to practice with. 965-0137 (home).

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FOR SALE: maxi suede coat size 7-9 (burnt orange), excel. cond. (orig. pr. $140) 1 year old, will sac. for $90. Pr. of Stereo Lights + remote control, excel. cond. $50. Call 245-8332 aft 5 p.m.

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Antique: 5 Queen Anne chairs, 1 arm chair. Antique drop leaf table – Walnut – Handmade – Well over 120 years old, 14x40 open. Phone 246-9766/call after 6 p.m.

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New bikes: 27" 10-speed boys, 26" 10-speed girls, 26" 5-speed boys, 3-speed girls 26", 1-speed girls - 26", 3-speed girls 20", 1-speed girls 20", 1-speed boys 20", coaster brake 16" side walk. Call after 4 p.m. (Sat. & Sun. or evenings after 6 p.m.) Ask for George - 296-8594.

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Camera – OLYMPUS PEN-FT SLR (half frame) 25mm wide angle & 150mm telephoto lenses & case. Good condition. $250. Call: 867-5728 after 6 p.m.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

The Astrogram is an official publication of the Ames Research Center, National Aeronautics and Space Administration, Moffett Field, California, and is published bi-weekly in the interest of Ames employees.

Editor . . . . . Meredith Moore
Associate Editor . . . . Marcia Kadota
Reporters . . . . . NASA Employees

Deadline for contributions: Thursday between publication dates

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National Aeronautics and Space Administration

Ames Research Center
Moffett Field, California 94035
AC 415 965-5091

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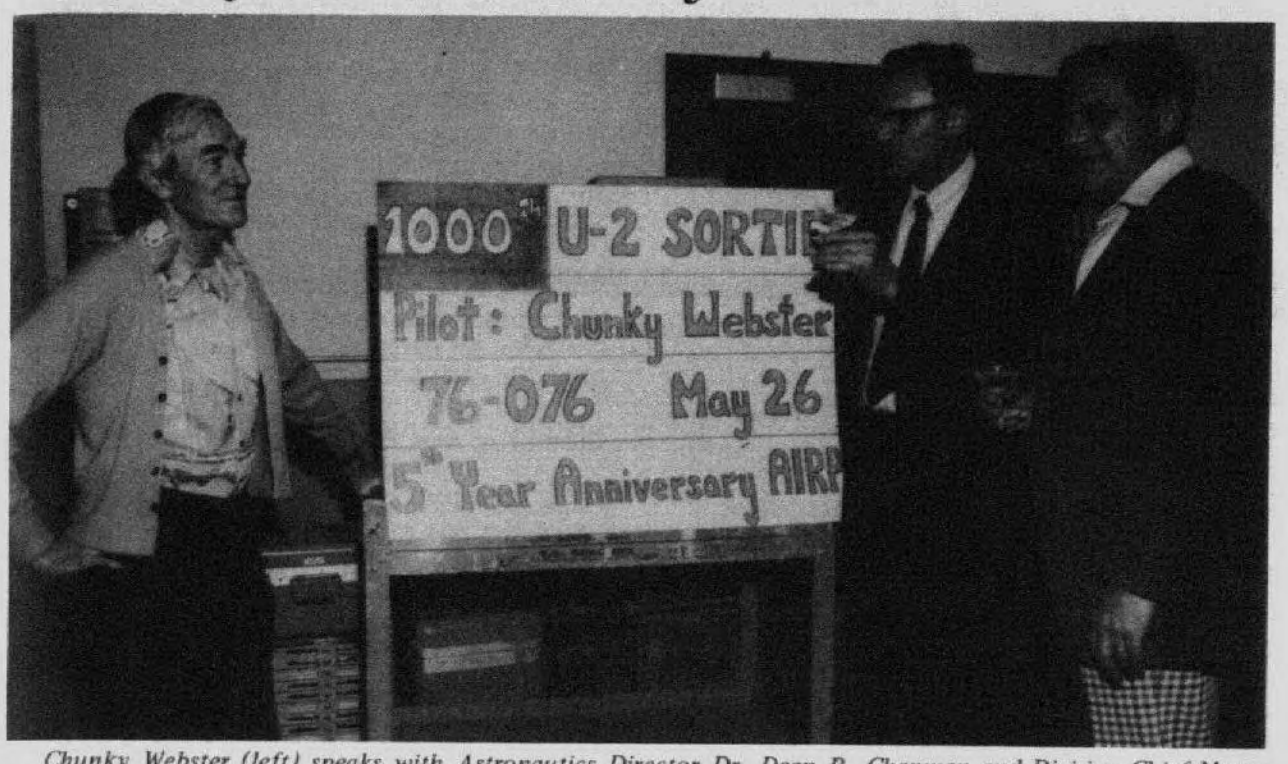
U-2 5-year anniversary



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Plymouth, Valiant, '74, radio & heater, 3 speed, 6 cyln., 21,700 miles, $2300. 253-7945.

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'69 Dodge Dart, 4-door sedan, good condition. Leaving country, must sell by Aug. 30. $800 or best offer. Call 964-7566 after 6 p.m. Goto.

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'72 36' Swanee Houseboat, twin 120 H.P. w.I.O., sleeps 6, nice condition, $14,500. Paul Jolissaint, home: 294-8350.

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FOR SALE: '69 V.W. Bug, 10,000 miles on new engine, 1600 cc, excellent condition. $1200. 961-1270 after 6 p.m.

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'72 Toyota Corolla 1600 Station Wagon. I'm moving. $1200. Paulk, 779-5965.

Housing

FOR SALE: 3 Bedroom, 2 bath, 2 car garage, family room, dining room, AEK, fireplace, w/w carpets, drapes, near Hollenbeck & Knickerbocker, Svale. Assumable 7% GI loan. Price at $64,950 – 735-9029.

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1 Bedroom apt., 1838 W. Bayshore, Palo Alto. Furnished or unfurnished, w/w carpeting, laundry room. Call 967-7672.

HOUSE FOR RENT: Furnished 3 bedroom, 2 bath house in Los Altos. Includes a family room, AEK, 2 fireplaces, washer, dryer, dish washer. Available on lease: Sept. 76 – June 77. NO PETS. Rent $585/month. Includes gardner and water. Cupertino School District. Large yard. Contact: Lee Neidleman, (415) 961-5672 evenings and weekends.

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3 Bedroom, 2 bath house in a 1/3 acre parklike setting with fireplace, large family room, and patio. Quiet neighborhood in Los Altos. 10 min to Ames by freeway. Available Aug. 15, $475 per mo., 941-3589.

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For Rent: 3 bedroom house near Los Altos High School and convenient to shopping. Extra large livingroom, fireplace, and patio suited to container gardening. Available Sept. 1. $375 per mo. 941-3589.

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Hywy 88 – 4,000 ft elev – 3 hrs from Bay Area, 1 acre with livable unfinished chalet. Panoramic view, private 1 mile road off Hywy 88. 1 bdrm, loft, deck, 1½ baths. 40 min to Kirkwood Ski. 3 yr old, $26,500 firm. (415) 826-5243.

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Furnished home, Los Altos, available during August, $300. Call R. Bach, 948-3716.

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Rental – Cabin S. Lake Tahoe, sleeps 8, 2 baths, T.V., telephone, fireplace, call 225-8043.

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Home for sale by owner: 4 bedrooms, 2 baths, separate family room w/fireplace. Superb landscaping w/sprinkler systems. Fruit trees, storage building in rear. Many other extras. $68,950. Owner will finance. For appointment call 255-6340.

Miscellaneous

WANTED: Carpool to and/or from University & Middlefield. Hours flexible. Am blind and cannot drive, will therefore share expenses. Ext. 5249 or 328-2112.

FOR SALE: Camper Shell: 36 in. Aluminum w/ sliding glass windows. Full back door, for short wide bed. $50. 735-9029.

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FOR SALE: (1) Radar Range – Amana, new. Will sell for $300. Call 734-4468 anytime. (2) Maytag Washer – excellent condition. $50. 734-4468.

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For Sale: Girls 3-speed bicycle. Black. Very good condition. $30. Ted Weber – 408-356-7388.

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Wht/gold bedroom set. Twin poster bed, mattress & box springs, double dresser, powder table, desk, bedside table. All matching, hardly used. BARGAIN at $200 (firm). 964-7062 eves.

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Guinea Pigs, male, FREE. 253-4475.

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FREE KITTENS. Long-haired and very cute. Call after 5 p.m. 946-1654. Rick, Ruth or Steve.

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Two solid Salem maple end tables. Full double tiered, 19" wide, 28" long, 26" high, flawless. $40 each. Two table lamps, brass with green glass, $20 each. Call 867-5982.

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Gemini House: Resale Boutique – Ladies Apparel – Novelties, 2383 Pruneridge Ave., Santa Clara, phone 241-1007.

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Hanging lamp made of shell chip, ball type. $5, phone 246-9766.

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Toy Collie (Sheltie) Pups, sable & white. 4 female, 2 male, AKC, shots, avail 7-31-76. $75–$100. 245-0327 (eves).

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Wanted in good condition: a 10" or 12" tricycle and a card table. Call 245-0666.

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WANTED: Room for rent, or apt. to share, near Univ. of Santa Clara. Want to rent during school year. I need a place to live. Contact Cathy Huber, 493-6854.

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Fourth driver for 8–4:30 carpool from Saratoga Village Center. Phone: 867-3794.

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WANTED: Would like to improve my sign language – need someone to practice with. 965-0137 (home).

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FOR SALE: maxi suede coat size 7-9 (burnt orange), excel. cond. (orig. pr. $140) 1 year old, will sac. for $90. Pr. of Stereo Lights + remote control, excel. cond. $50. Call 245-8332 aft 5 p.m.

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Antique: 5 Queen Anne chairs, 1 arm chair. Antique drop leaf table – Walnut – Handmade – Well over 120 years old, 14x40 open. Phone 246-9766/call after 6 p.m.

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New bikes: 27" 10-speed boys, 26" 10-speed girls, 26" 5-speed boys, 3-speed girls 26", 1-speed girls - 26", 3-speed girls 20", 1-speed girls 20", 1-speed boys 20", coaster brake 16" side walk. Call after 4 p.m. (Sat. & Sun. or evenings after 6 p.m.) Ask for George - 296-8594.

– – – – –

Camera – OLYMPUS PEN-FT SLR (half frame) 25mm wide angle & 150mm telephoto lenses & case. Good condition. $250. Call: 867-5728 after 6 p.m.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

The Astrogram is an official publication of the Ames Research Center, National Aeronautics and Space Administration, Moffett Field, California, and is published bi-weekly in the interest of Ames employees.

Editor . . . . . Meredith Moore
Associate Editor . . . . Marcia Kadota
Reporters . . . . . NASA Employees

Deadline for contributions: Thursday between publication dates

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National Aeronautics and Space Administration

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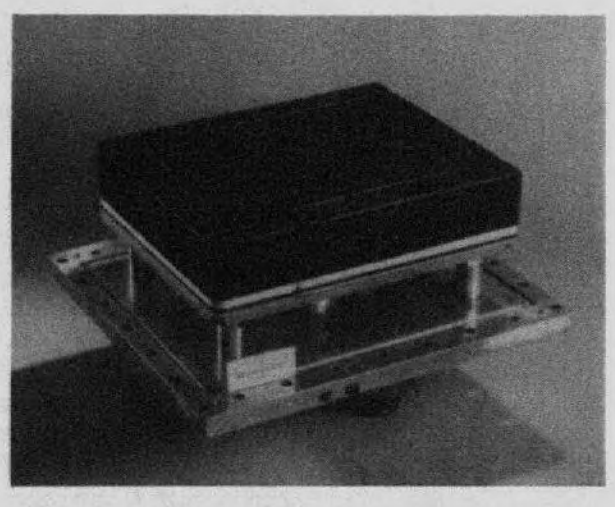

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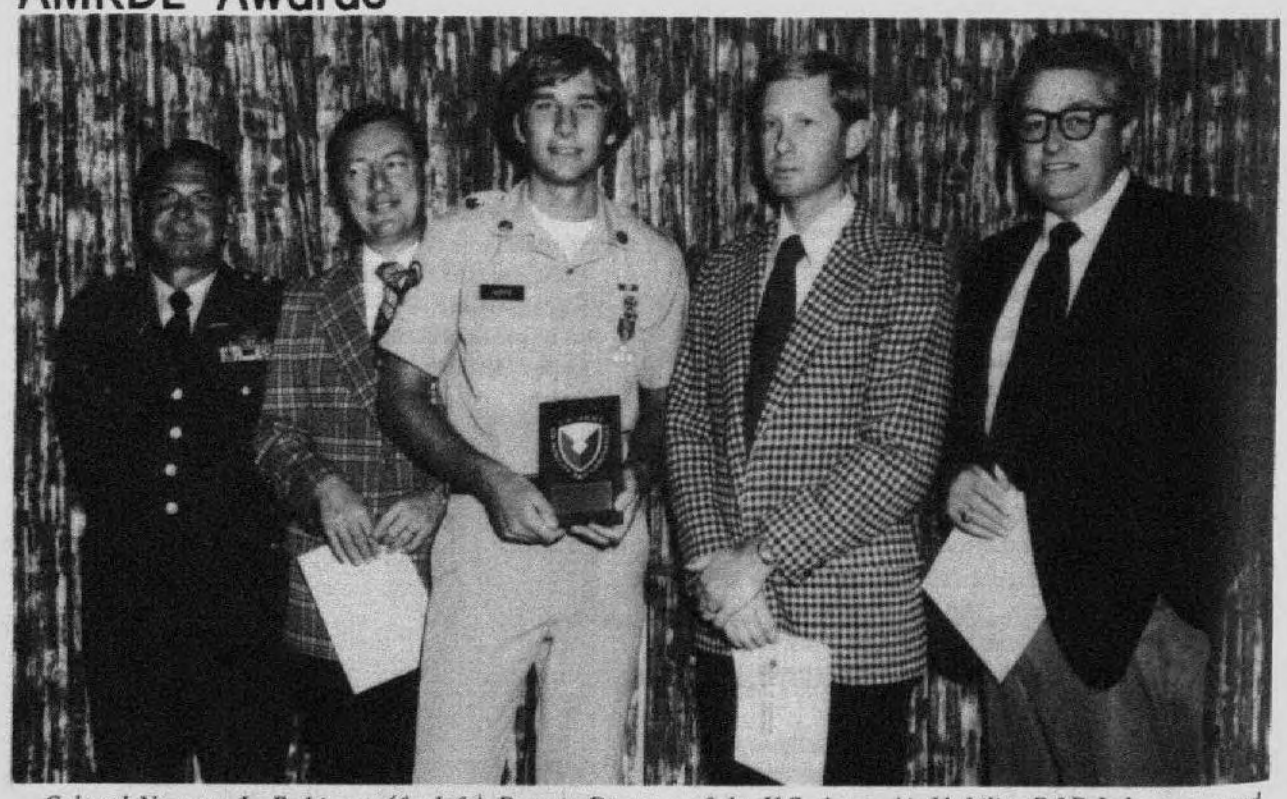
AMRDL Awards



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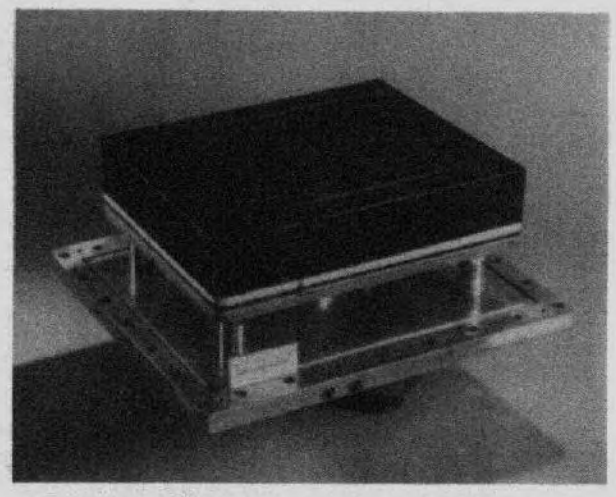

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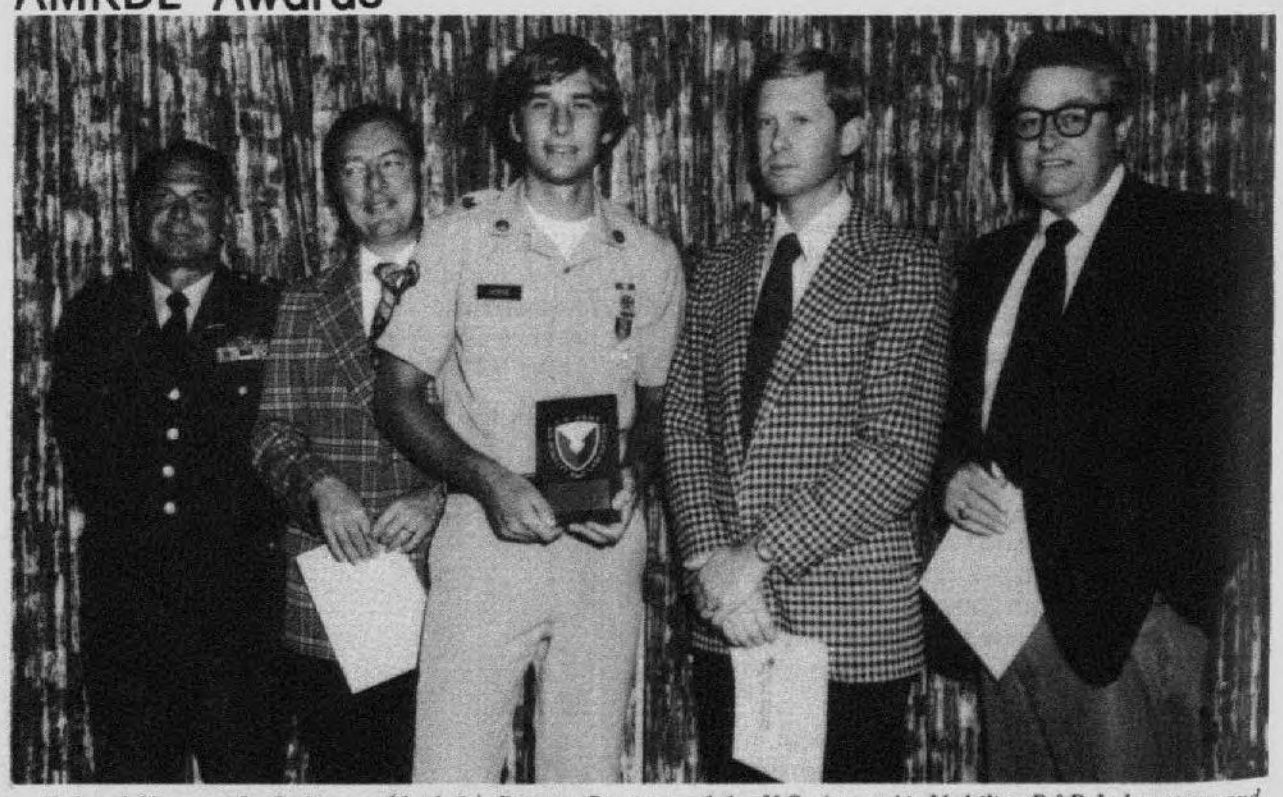

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ARA ACTIVITIES

Tickets for the September 17th Moffett Field evening at Great America are available at the ARA Store, M-W-Fridays, 12-12:45 p.m. Price is $5.00 and includes parking and entrance fee.

CLUB NEWS –

The year-end competition was judged by Don Douglas. Winning entries are on display at the Main Library. The winners in each category are:

Black and White Prints
1st Place – "American Freedom Train" by Jerry P. Barrack
2nd Place – "Phantom Fountain" by Norm Sherwood
3rd Place – "Bay Estates" by Richard Fish

Color Pictorial Prints
1st Place – "Hi There" by Bob Eglington
2nd Place – "Hot Forge" by Steve G. Deiwert
3rd Place – "Rhondo" by Don R. Reynolds

Color Nature Prints
1st Place – "Wood Lake Canal-West" by Steve G. Deiwert
2nd Place – "Gull Friend" by Paul Dexter
3rd Place – "One Down – Two to Go" by Jack Ratcliff

Pictorial Color Slides
1st Place – "Muir Pass Alpenglow" by Wendell Love
2nd Place – "Monarch Butterfly" by William D. Bachalo
3rd Place – "Along The Trail" by Trevor Eiseman

Nature Color Slides
1st Place – "Garden Spider" by Joe Licursi
2nd Place – "Holly Hock #2" by Lynn Hunton
3rd Place – "Rillian Turning Point" by Joe Licursi

Jetsetters' news

20 August – WINE AND DINE CRUISE. Cost: $21.00 per person. Includes motorcoach transportation from Moffett Field to San Francisco and return; Bay Cruise – Fisherman's Wharf to Jack London Square; Dinner at Bow and Bell or Sea Wolf restaurants, Complimentary Wine on return trip. For information contact Marian Davis, Ext. 5832, Mail Stop 206-3.

10–12 September – THE RENO AIR RACES. Cost $78.00 per person/double occupancy. Includes motorcoach transportation from Moffett Field to Reno and return; two nights' accommodations in Reno; Reserved Seating (Saturday and Sunday); Saturday evening party; Gambling Refund ($22.00 value). Check your bulletin board for complete notice or contact Marian Davis, Ext. 5832, Mail Stop 206-3.

18–19 September – HEARST CASTLE. For information contact Ruthie White, Ext. 5157, Mail Stop 202-3. Full information will be published in the next issue of the Astrogram.

23–24 October – GOLD COUNTRY.

19–21 November – LAS VEGAS.

Golf

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Vice President –	Earl Levin
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TO APPLY: Call extension 5599 or 5600.

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ARA ACTIVITIES

Tickets for the September 17th Moffett Field evening at Great America are available at the ARA Store, M-W-Fridays, 12-12:45 p.m. Price is $5.00 and includes parking and entrance fee.

CLUB NEWS –

The year-end competition was judged by Don Douglas. Winning entries are on display at the Main Library. The winners in each category are:

Black and White Prints
1st Place – "American Freedom Train" by Jerry P. Barrack
2nd Place – "Phantom Fountain" by Norm Sherwood
3rd Place – "Bay Estates" by Richard Fish

Color Pictorial Prints
1st Place – "Hi There" by Bob Eglington
2nd Place – "Hot Forge" by Steve G. Deiwert
3rd Place – "Rhondo" by Don R. Reynolds

Color Nature Prints
1st Place – "Wood Lake Canal-West" by Steve G. Deiwert
2nd Place – "Gull Friend" by Paul Dexter
3rd Place – "One Down – Two to Go" by Jack Ratcliff

Pictorial Color Slides
1st Place – "Muir Pass Alpenglow" by Wendell Love
2nd Place – "Monarch Butterfly" by William D. Bachalo
3rd Place – "Along The Trail" by Trevor Eiseman

Nature Color Slides
1st Place – "Garden Spider" by Joe Licursi
2nd Place – "Holly Hock #2" by Lynn Hunton
3rd Place – "Rillian Turning Point" by Joe Licursi

Jetsetters' news

20 August – WINE AND DINE CRUISE. Cost: $21.00 per person. Includes motorcoach transportation from Moffett Field to San Francisco and return; Bay Cruise – Fisherman's Wharf to Jack London Square; Dinner at Bow and Bell or Sea Wolf restaurants, Complimentary Wine on return trip. For information contact Marian Davis, Ext. 5832, Mail Stop 206-3.

10–12 September – THE RENO AIR RACES. Cost $78.00 per person/double occupancy. Includes motorcoach transportation from Moffett Field to Reno and return; two nights' accommodations in Reno; Reserved Seating (Saturday and Sunday); Saturday evening party; Gambling Refund ($22.00 value). Check your bulletin board for complete notice or contact Marian Davis, Ext. 5832, Mail Stop 206-3.

18–19 September – HEARST CASTLE. For information contact Ruthie White, Ext. 5157, Mail Stop 202-3. Full information will be published in the next issue of the Astrogram.

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The Astrogram

VOLUME XVIII NUMBER 25 August 26, 1976

NASA studying lighter-than-air vehicles

Today's concern for the environment and for energy conservation has generated new interest in a means of flight older than the airplane.

Airships were once an established element in world-wide transportation, providing the only means of non-stop rapid travel across the world's oceans. Later, during and after World War II, they were the bulwark of this nation's antisubmarine defenses. The only current role for the airship, at least in this country, is advertising.

However, new requirements for transporting heavy loads in power plant construction, transferring ship cargos to shore points, and providing economical, quiet and energy conservative inter-city transportation are reviving interest in lighter-than-air vehicles. Military planners, too, are taking another look at the use of airships for some military missions for which they seem to be particularly well adapted.

These new civil and military applications will require vehicle concepts which do not resemble the airships of the past. Instead they may combine elements of both heavier-than-air vehicles (airplanes) and lighter-than-air vehicles (airships).

Ames is currently studying two lighter-than-air concepts for civil use through a contract with Goodyear Aerospace Corp., Akron, Ohio.

The first of these concepts is being studied for its potential as part of a future short-haul transportation system. The vehicle would be used as a feeder airliner and would be 60 m (200 ft) long and carry 80 passengers. Although this is about the size of a Goodyear blimp, its carrying capacity is three times as great.

It would cruise at 160 knots (176 mph) and be able to land and take off vertically. Power would be furnished by four turboprop engines driving large prop-rotors which could be tilted upward for takeoff and landing.

This concept is particularly attractive today because of its potential for reduction of noise and fuel consumption.

The other concept under study is for a vehicle to transport large, heavy payloads over comparatively short distances. This concept, called a heavy lifter, combines features of large dirigibles and helicopter-type rotor systems to provide lifting capacity far beyond that of either vehicle type alone. Dirigible buoyancy is used to lift the vehicle empty weight, leaving the total lifting capacity of the rotor system to lift and support the payload. Vehicles capable of lifting payloads of up to 225,000 kg (250 tons) have been considered.

A smaller proof-of-concept version of a heavy lifter capable of lifting 67,500 kg (75 tons) is under study. This version would use four helicopter rotor systems supported by a dirigible hull of 75,000 cubic meters (2.5 million cubic feet) displacement.

Of the two vehicles, the heavy lifter appears the most likely for immediate application, transporting heavy power generating equipment or other outsize, heavy industrial equipment, particularly when the destination is a remote area not served by other heavy transportation systems.

There are also several potential military missions for the heavy lifter. Principal among these is for transporting ship cargos over the beach to shore points.

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NASA-ASEE design study: Project Orion

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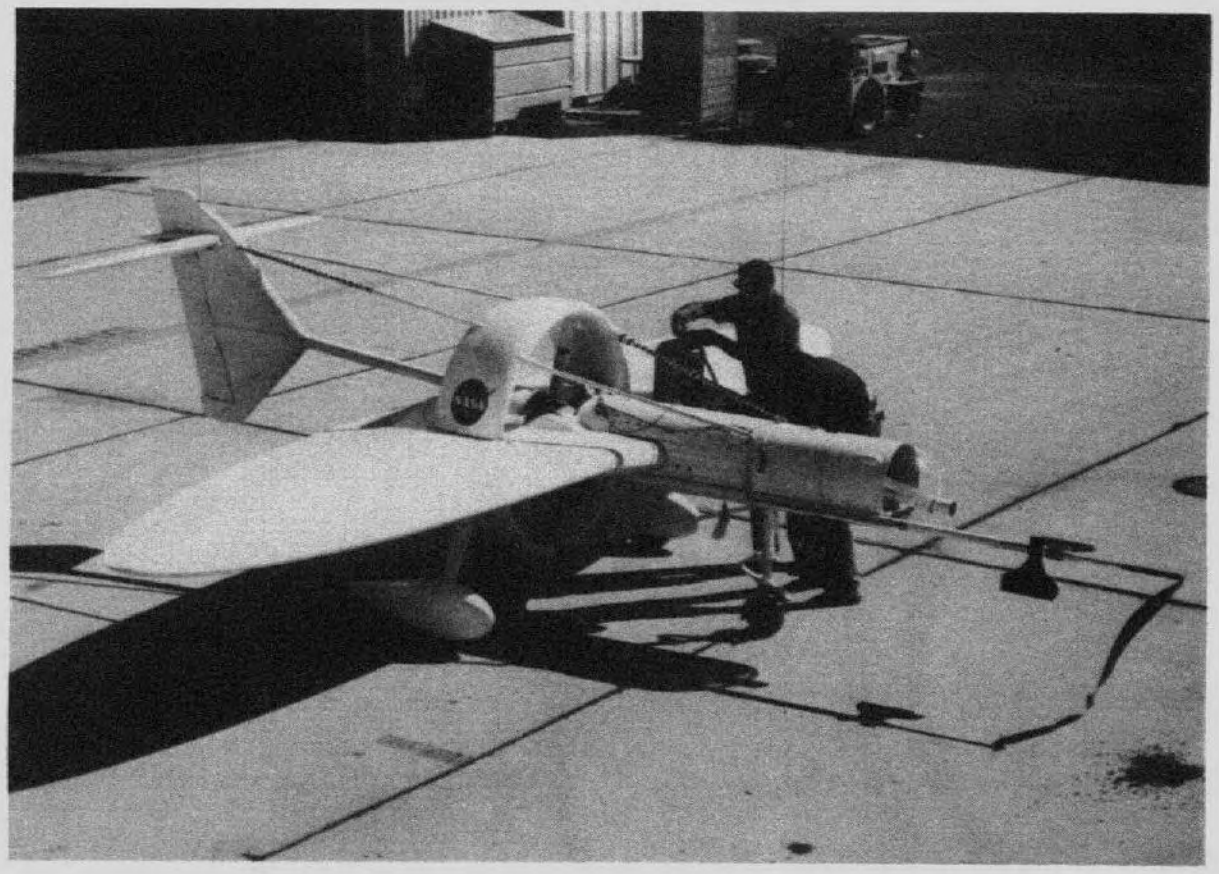
(Continued on Page 4)

Remotely Piloted Research Vehicle



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C-141 telescope mirrors undergo cleaning process

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Since the mirrors were transported to Tucson aboard the C-141, it seemed logical to put the observatory on display at Tucson International Airport for interested visitors to view and tour. The honored guest during the 24-hour stay was Mrs. Gerard P. Kuiper who resides in Tucson. This was her second time aboard the aircraft which bears the name of her deceased husband. She had first toured it one year ago when dedication ceremonies took place at the Tucson Airport.

Unloading the mirrors from the C-141's telescope are (l. to r.) Bruce Kelley, SEM, (back to camera); Ralph Zackarias, Contraves-Goerz Corp. (standing); Ben Houston, SEM, (hidden from camera); Bob Barrow, Walter V. Sterling Co.; Don Oishi, SEM; and Robert T. Bell, RSS.

It was in 1960 that her husband established and directed the Lunar and Planetary Laboratory at the University of Arizona in Tucson. Dr. Kuiper was an exceptionally brilliant astronomer with an internationally recognized reputation. His laboratory carries on his brilliance in the study of the moon and its planets in a research and teaching atmosphere.

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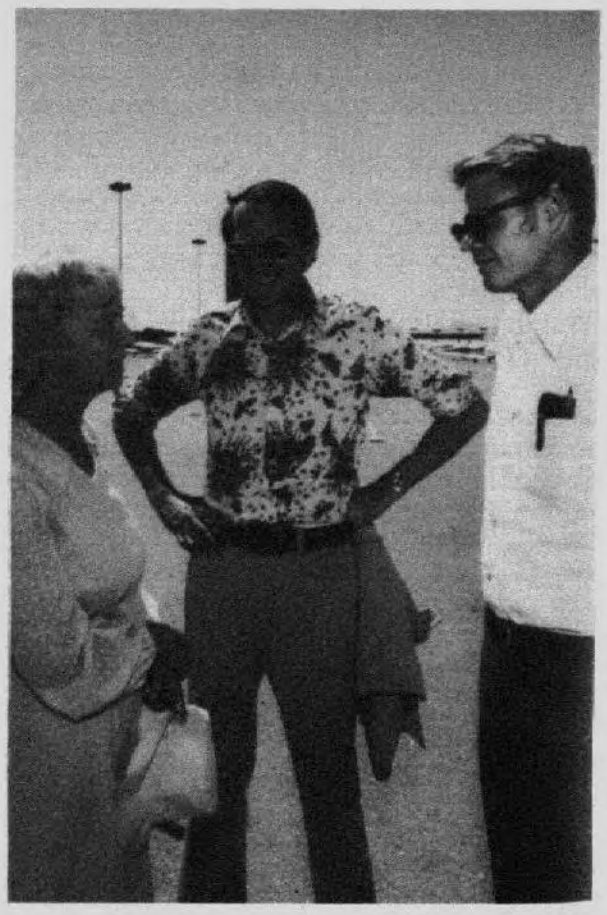
Carl Gillespie, KAO Program Manager, talks with Tucson newsmedia.



Sarah Kuiper chats with Bob Cameron and Dale Compton while waiting for the tour of the Kuiper Astronomical Observatory (KAO) to begin.

The laser velocimeter has been successfully applied to measure pressure distributions on 2-D airfoils in transonic flow and to measure mean and fluctuating velocity profiles in a shock-induced separated, turbulent boundary layer.

Hazard boundaries for the Wake Vortex Avoidance System under development by the FAA were assessed by NASA, FAA, and Air Force pilots for two classes of jet transports during visual and instrument approaches using the FSAA.

A new three-axis pointing and control system for remotely controlled telescopes has been successfully tested at Ames. VIP (for Video Inertial Pointing) uses a state-of-the-art charge-coupled device video star tracker connected to a micro-computer built into the VIP electronics to provide automatic correction and steering signals to the telescope gyro-stabilization system. The remote operator may view the star field, as seen by the video tracker, on a cathode ray tube display at the control console, as well as continuously position the telescope optical axis by commands to the VIP computer.

It has been shown by Ames researchers that waves observed to propagate in the Crab Nebula imply a dramatically small upper limit of 10^{-53} grams on the mass of a photon. The new upper limit is about a hundred thousand times smaller than the previous best limit.

Ames researchers have found that the amount of particles added to the stratosphere during periods of high volcanic activity could account for some of the cooling trends experienced over the last several centuries, as well as for parts of the last major ice age.

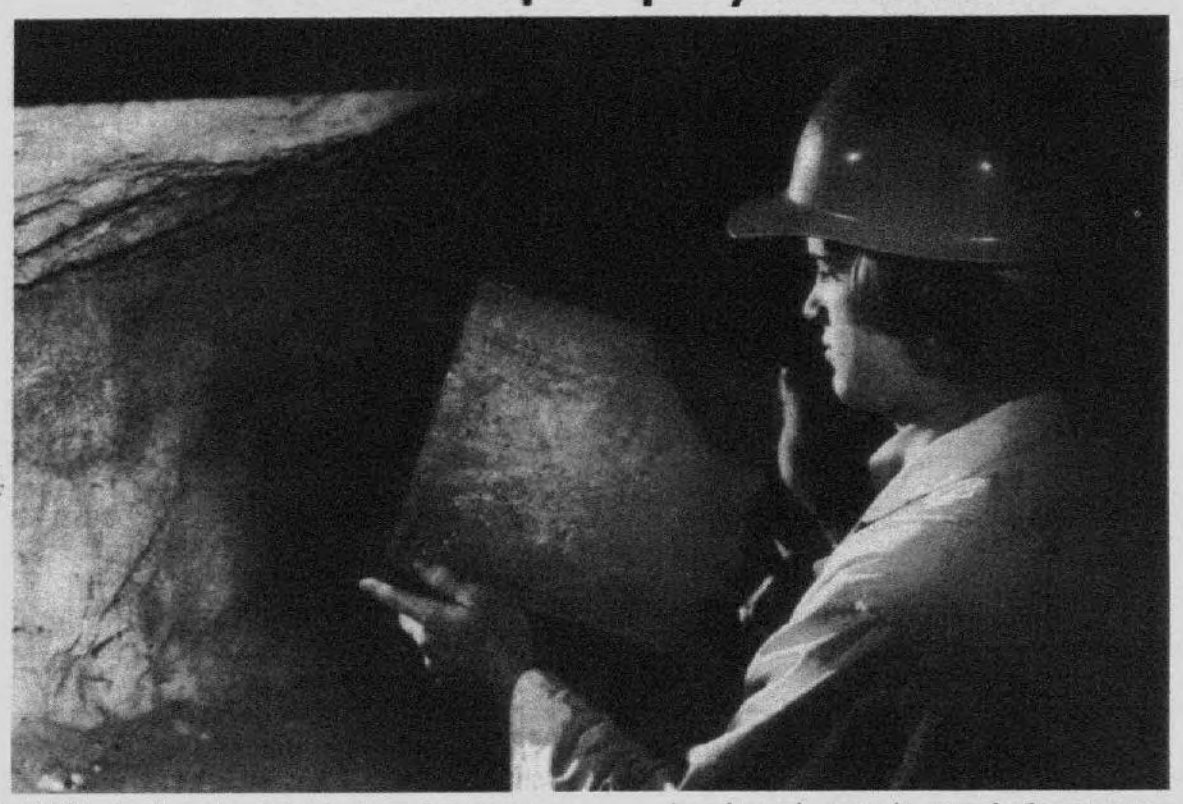
Measurements of stratospheric nitric oxide and ozone using our U-2 aircraft flying from Moffett Field, Alaska, Hawaii and Wallops, show large unexpected seasonal variations and meridional distributions with pronounced polar region enhancement. The newly-developed Ames 2-D stratospheric model is predicting similar variations.

Ames' researchers developed computer codes solving Schroedinger's equation for the wave function of diatonic molecules with sufficient precision that most properties of these molecules (dissociation energy, optical band strengths, dipole moments, etc.) can be derived with better accuracy than measurable by experiment.

The Ames Heat Pipe Experiment, which was launched on-board the Orbiting Astronomical Observatory (OAO-C) in August 1972, was recently retested after more than three years in orbit. The tests were highly successful, providing flight level confidence in the long term use of gas-controlled heatpipes in space applications.

The Advanced Thermal Control Flight experiment, which was launched on-board the Advanced Technology Satellite (ATS-6) in May 1974, was completed. The results show that diode and feedback-controlled heat pipes function reliably in space and that a phase-change material, octadecane, can be used in 0-g to provide energy storage.

NASA-developed polyimide foam



A NASA developed polyimide foam has demonstrated via full scale testing that the foam can survive a major mine fire without fire propagation from the fire source throughout the mine.

Ames investigations of the Delayed Flap Approach for jet transport landings have shown that the use of these procedures by commercial airlines will save hundreds of pounds of fuel per landing as well as reduce the noise impact of the aircraft when compared to conventional approaches.

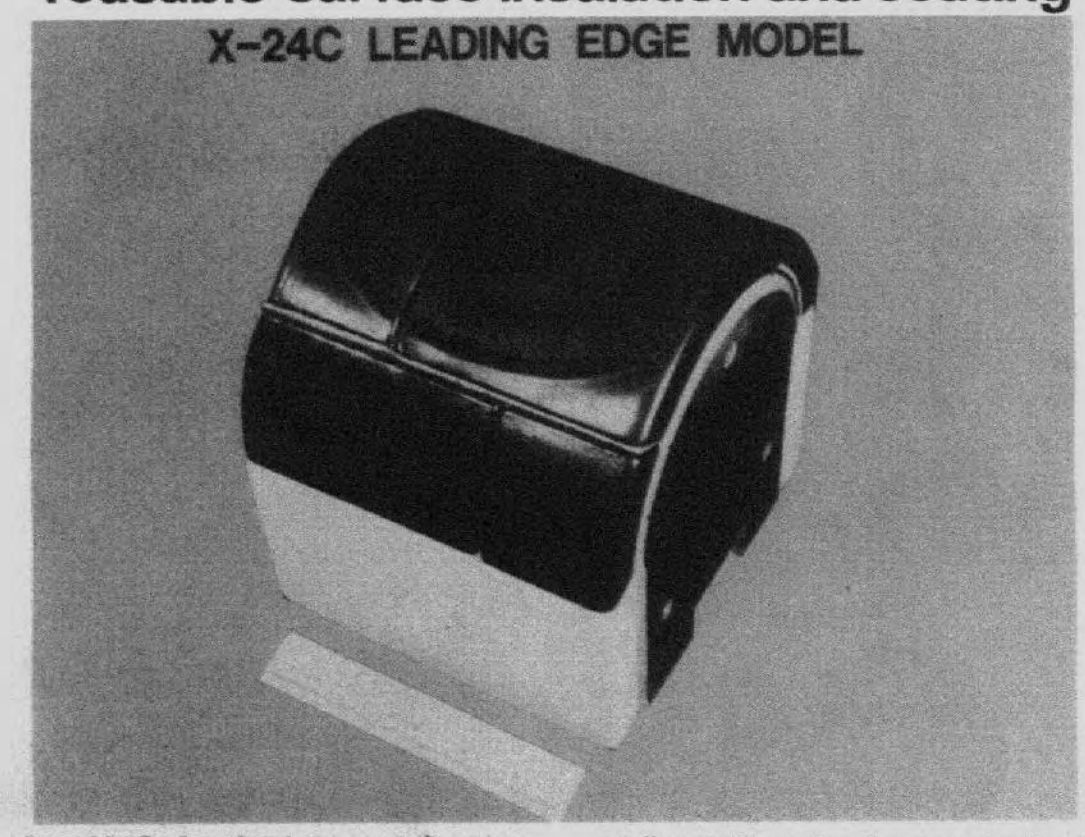
A joint ARC/California Division of Forestry project concerning an automated remote fire weather data network has begun. The test area covers the northwestern portion of California, stretching from San Francisco to the Oregon border and bounded by the Pacific Ocean and the Coast Range Mountains. These remote stations will automatically sense weather conditions in the wild that might be indicative of dangerous fire conditions and transmit this data to Sacramento via the SMS-GOES satellite.

Ames' researchers obtained the first precision photographs of shock-wave water droplet interaction at shock speeds to 7 km/sec and air pressures to 380 torr, simulating the conditions in flow about space vehicles entering earth's atmosphere through clouds.

A joint scientific mission with the CV-990 aircraft was completed in mid-1975 involving NASA and the European Space Agency to simulate future Spacelab operations for assisting in Spacelab planning. An important feature of the mission was the use of experiment operators in place of the principal investigators, as will be done in Spacelab.

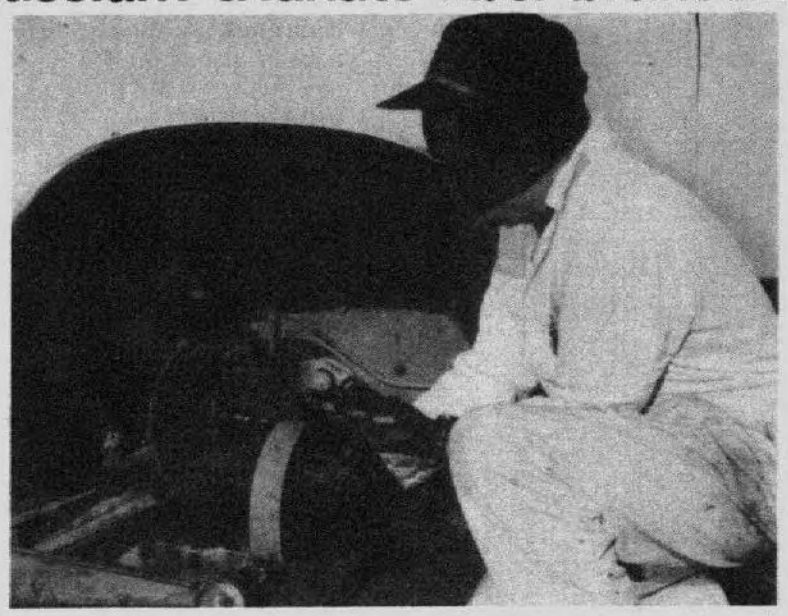
Aerodynamic tests in pure hydrogen were conducted for the first time ever in the Hypersonic Freeflight Aerodynamic Facility at velocities up to 5 km/sec. Data from these tests will be used to design entry probes for the outer planets (Jupiter, Saturn, Uranus) whose atmospheres contain large percentages of hydrogen.

reusable surface insulation and coating



Ames Reusable Surface Insulation and Coating has been adopted by Martin Marietta Company as the leading edge heat shield material for their proposed version of the X-24C hypersonic research vehicle. Martin is now manufacturing the material in small quantities using the Ames-developed process. Successful flight tests of the material have been made on the X-24B aircraft at NASA-Flight Research Center.

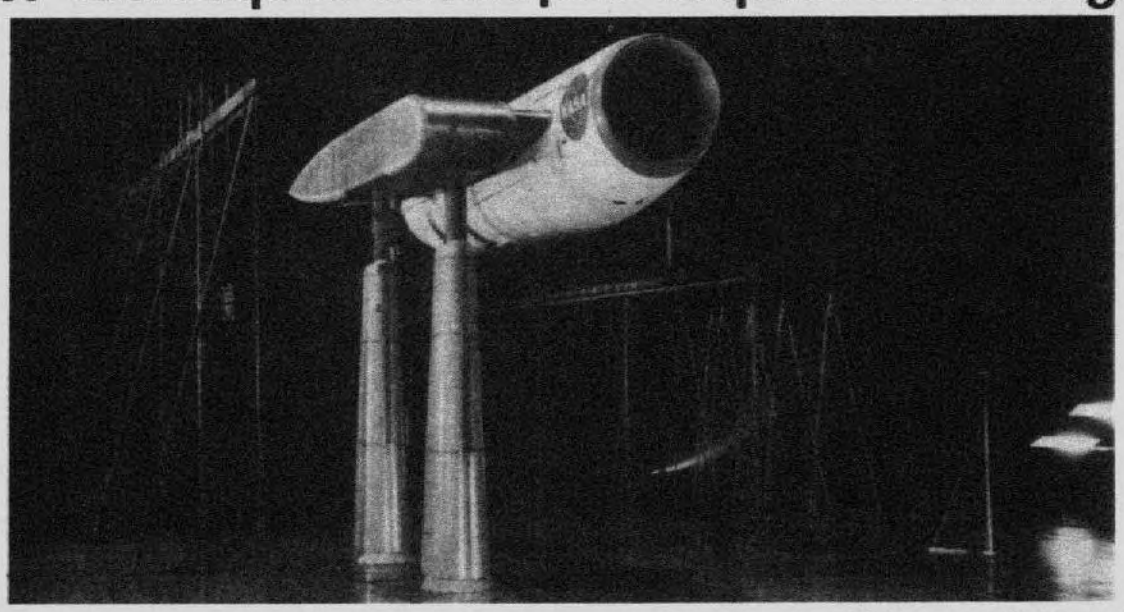
potassium titanate fiber brake linings



The substitution of potassium titanate fiber for the historically used asbestos in road vehicle brake linings has been found to provide cost effective linings with substantially longer wear durations and higher friction stability.

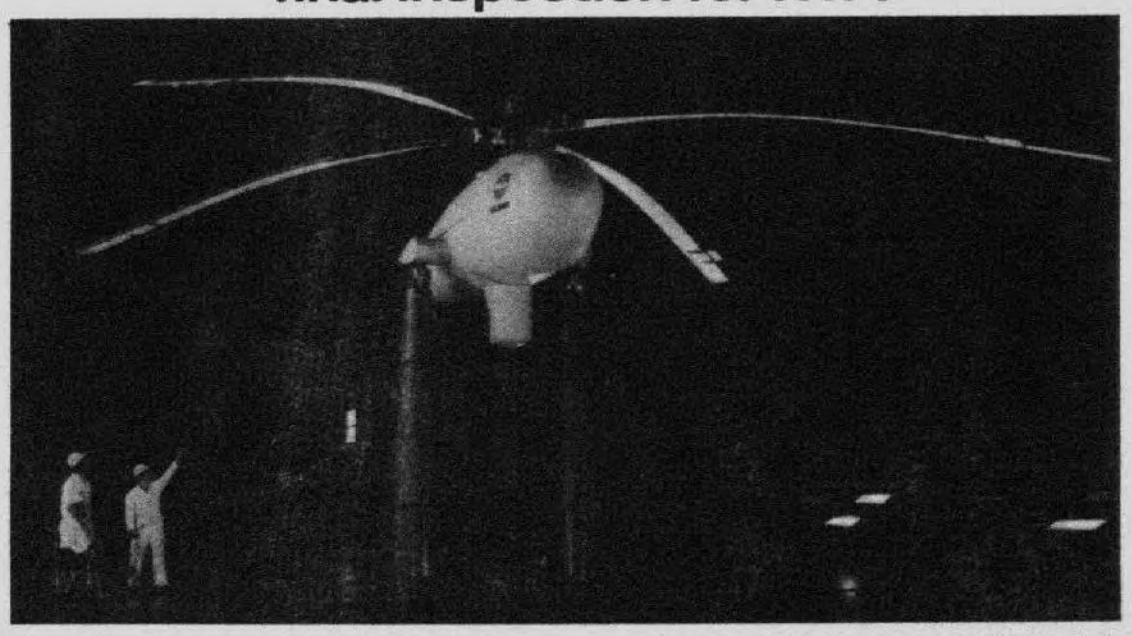
Ames researchers showed, by use of appropriate atmospheric models, that ozone destruction by space shuttle launch operations will probably be, at most, a few tenths of one percent, perhaps much less.

new techniques developed to quiet JT8D engines



Recent flight tests have revealed that exhaust noise suppressors are not as effective in flight as had been predicted by static ground tests. Tests in the 40- X 80-Foot Wind Tunnel provided data on new techniques which will more effectively and efficiently quiet the JT8D during flight conditions. Since there are more JT8D engines flying in commercial aircraft than any other engine, this research should significantly contribute to reducing community annoyance around airports.

final inspection for RTA



The Rotor Test Apparatus (RTA) for use in the 40- X 80-Foot Wind Tunnel passed its final acceptance tests and was put to immediate use testing full-scale helicopter rotors. The RTA can spin rotors of 35 ft to 60 ft in diameter to tip Mach numbers greater than 1.0. Rotors can be "flown" from the tunnel's control room to simulate various rotor loadings and flight conditions up to 200 knots, including accelerating, climbing, level flight, gliding, and auto rotation regimes.

After completing a thorough self evaluation of the Equal Opportunity Program, the new year started with a new outlook on achieving equal opportunity for Ames employees. Throughout 1975, some of the ideas and suggestions coming from the self evaluation were implemented.

Starting in the January 30th edition of the Astrogram, all merit promotion job announcements were advertised, with the names of the selections made for each job. Also advertised has been local training courses, with more emphasis on in-house training.

Throughout the year various advisory committees to the EOP Office have sponsored programs for all employees. These programs were developed to raise the consciousness level of all people. During the second week of February, Black employees were honored for their contributions in the Center's accomplishment with a special photographic exhibition on view in the library in observance of Black History. Students from local high schools were invited to tour Ames during the week.

The United Nations proclaimed 1975 as International Women's Year, and Ames Research Center celebrated the year with various activities. "The Bicentennial Woman" was the theme of our first Federal Women's Week. The week, developed by the Women's Advisory Group, held a number of training sessions for all employees, which proved to be [illegible] enlightening and exciting for all those who atte[illegible]

Studies on child care and Flextime were initiated with ongoing investigation still in process. Five more upward mobility jobs have been offered this year, giving more opportunities to non-professionals in dead-end jobs.

Every month the Director has met with a group of employees randomly selected from the Center. This meeting is to facilitate informal communication lines between employee and management, in both directions.

The self evaluation identified some of the weakness at the Center; in 1975 EEO tried to see that the proper action be taken to correct it. There is much more to be done, but we are coming closer to seeing equal opportunities for all people.

honors and award[illegible]

The Federal Executive Board presented Dr. Paul X. Callahan with the "Federal People Reach Out Award."

Charles F. Hall received the "Golden Plate" award from the Academy of Achievement.

Ruth Smith received the Langley Achievement Award.

Two children of two Ames employees (Donald Frolich and William Carlson) received scholarships from the Federal Personnel Council.

Dean Chapman was named to the National Academy of Engineers.

Paul Kutler was honored by the receipt of the H. Julian Allen Award and also received the "Outstanding Young Alumnus Award" from the Iowa State University.

Many individuals celebrated milestones in the length of service they have spent with the federal government as of 1975: one gentleman reaches 40 years of service; eight people, 35 years; forty-seven people, 30 years; thirty-three people, 25 years; and 68 people, 20 years.

There were 30 Special Achievement Awards for performance and for contributions earned by Ames employees during the 1975 calendar year.

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

NASA

The Astrogram

VOLUME XVIII NUMBER 25 August 26, 1976

NASA studying lighter-than-air vehicles

Today's concern for the environment and for energy conservation has generated new interest in a means of flight older than the airplane.

Airships were once an established element in world-wide transportation, providing the only means of non-stop rapid travel across the world's oceans. Later, during and after World War II, they were the bulwark of this nation's antisubmarine defenses. The only current role for the airship, at least in this country, is advertising.

However, new requirements for transporting heavy loads in power plant construction, transferring ship cargos to shore points, and providing economical, quiet and energy conservative inter-city transportation are reviving interest in lighter-than-air vehicles. Military planners, too, are taking another look at the use of airships for some military missions for which they seem to be particularly well adapted.

These new civil and military applications will require vehicle concepts which do not resemble the airships of the past. Instead they may combine elements of both heavier-than-air vehicles (airplanes) and lighter-than-air vehicles (airships).

Ames is currently studying two lighter-than-air concepts for civil use through a contract with Goodyear Aerospace Corp., Akron, Ohio.

The first of these concepts is being studied for its potential as part of a future short-haul transportation system. The vehicle would be used as a feeder airliner and would be 60 m (200 ft) long and carry 80 passengers. Although this is about the size of a Goodyear blimp, its carrying capacity is three times as great.

It would cruise at 160 knots (176 mph) and be able to land and take off vertically. Power would be furnished by four turboprop engines driving large prop-rotors which could be tilted upward for takeoff and landing.

This concept is particularly attractive today because of its potential for reduction of noise and fuel consumption.

The other concept under study is for a vehicle to transport large, heavy payloads over comparatively short distances. This concept, called a heavy lifter, combines features of large dirigibles and helicopter-type rotor systems to provide lifting capacity far beyond that of either vehicle type alone. Dirigible buoyancy is used to lift the vehicle empty weight, leaving the total lifting capacity of the rotor system to lift and support the payload. Vehicles capable of lifting payloads of up to 225,000 kg (250 tons) have been considered.

A smaller proof-of-concept version of a heavy lifter capable of lifting 67,500 kg (75 tons) is under study. This version would use four helicopter rotor systems supported by a dirigible hull of 75,000 cubic meters (2.5 million cubic feet) displacement.

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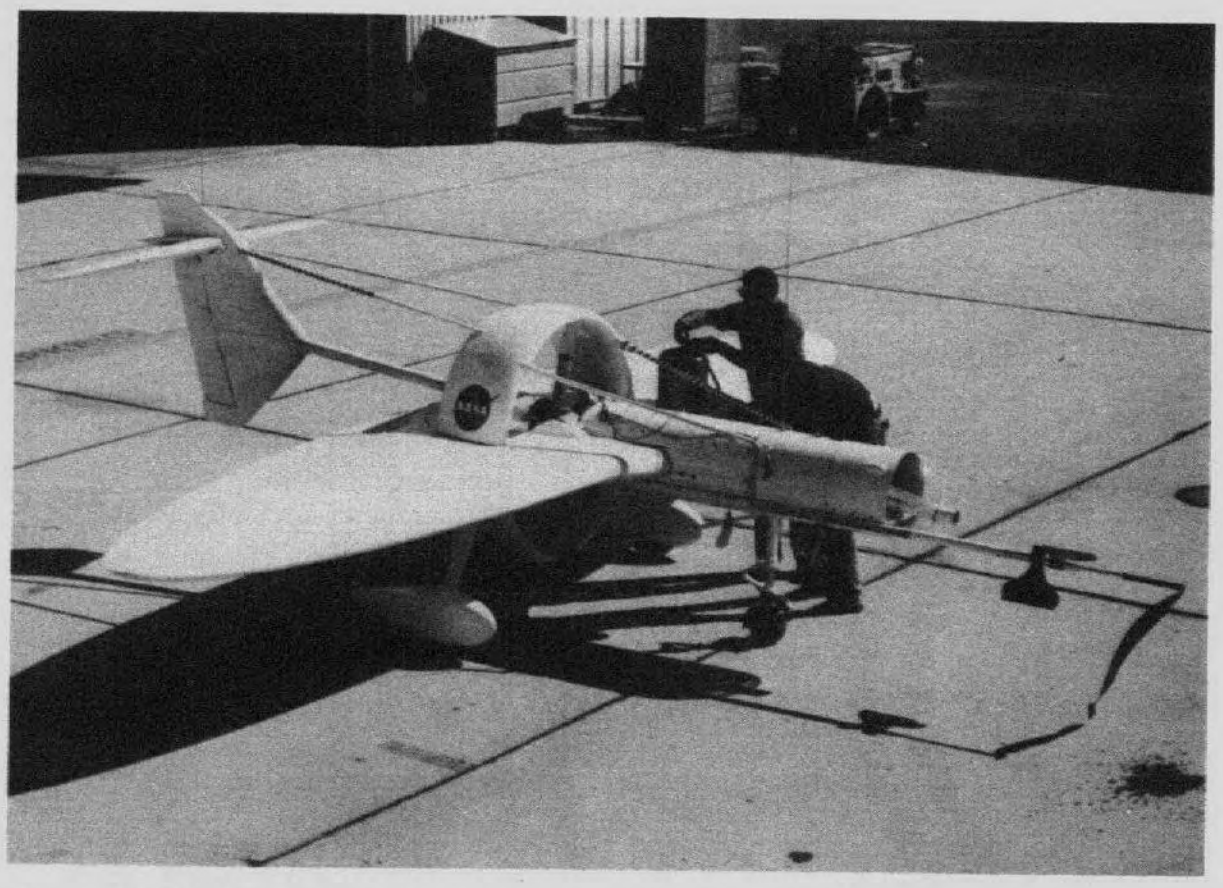

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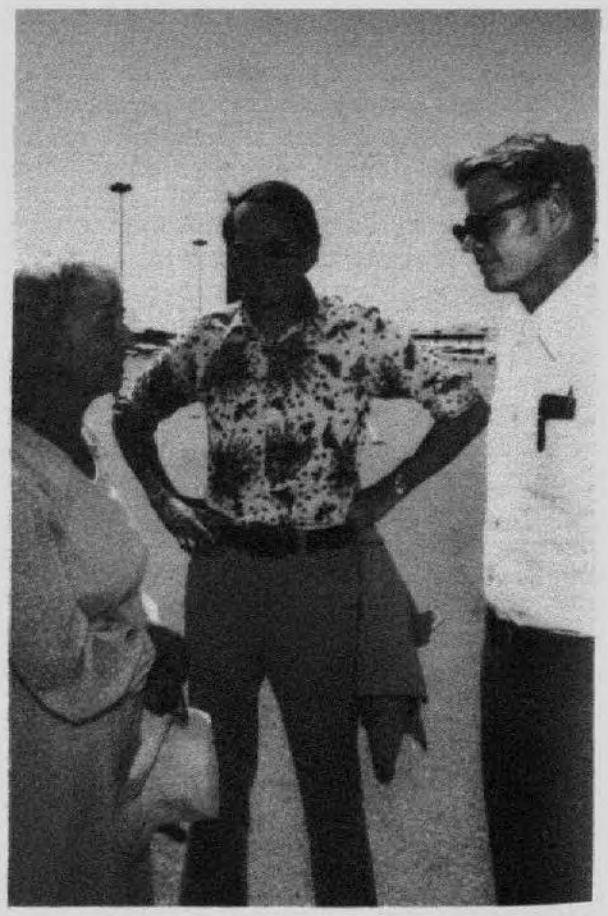

Sarah Kuiper chats with Bob Cameron and Dale Compton while waiting for the tour of the Kuiper Astronomical Observatory (KAO) to begin.

Mirrors are cleaned; KAO on display

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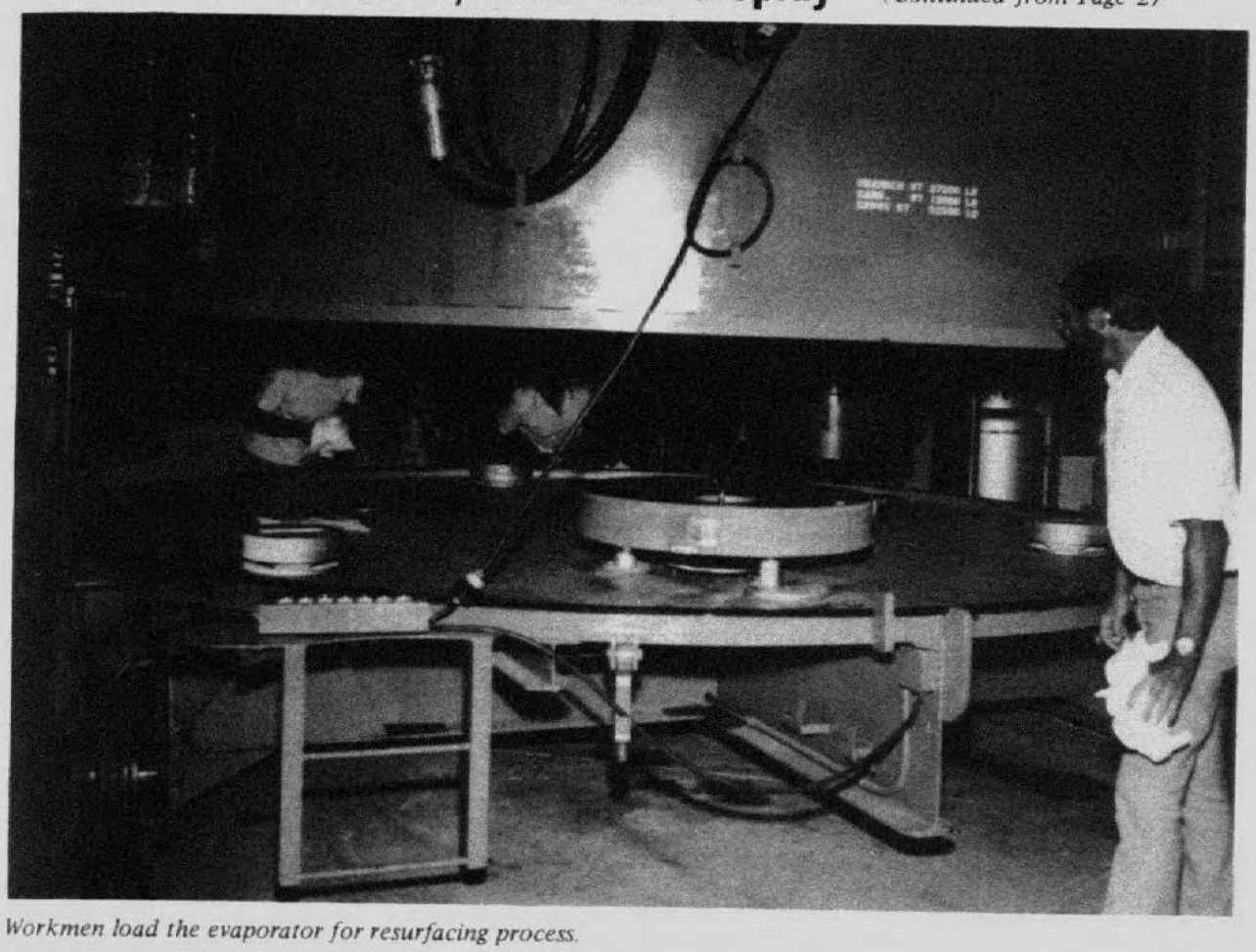
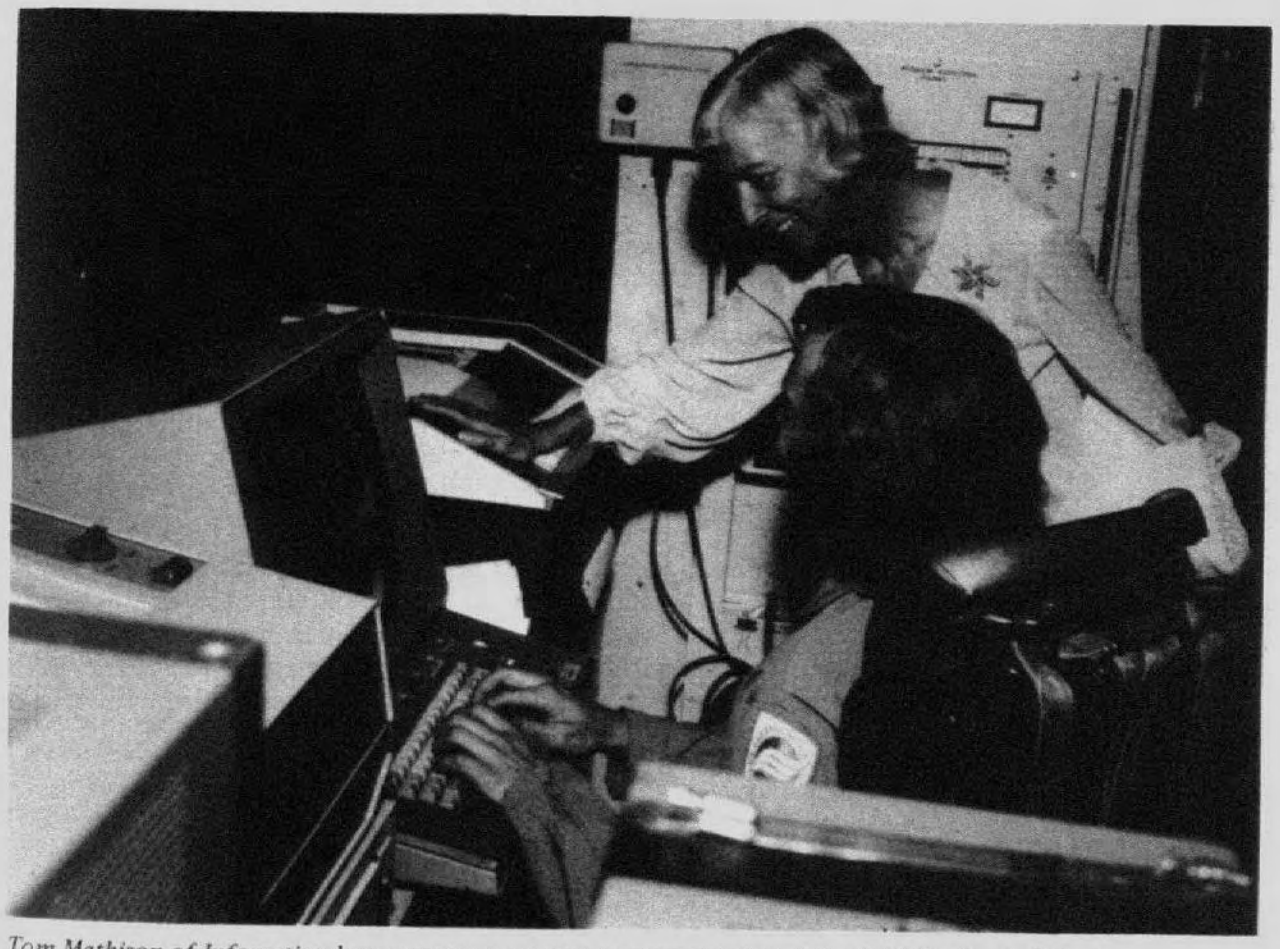


Workmen load the evaporator for resurfacing process.

Bruce Kelly (Ames) and Randy Meyers (Walter V. Sterling Co.) prepare to reinstall the mirrors.



Tom Mathison of Infomatics demonstrates a computer operation aboard the KAO for Sarah Kuiper.

US/Soviet publication

The three-volume English edition of the joint U.S.-U.S.S.R. "Foundations of Space Biology and Medicine" has been published by the U.S. Government Printing Office.

The Soviet Union previously published a Russian-language version in Moscow.

The publication is the result of several years' work by the U.S.-U.S.S.R. Joint Editorial Board on Space Biology and Medicine, formed in October 1965 by NASA and the Soviet Academy of Sciences. The work summarizes the biological and medical results of the first 15 years of space flight.

NASA, ERDA select team to build largest windmill

The largest windmill in history will be built during the next two years, according to plans of NASA and the Energy Research and Development Administration (ERDA). The two agencies have recently chosen an industrial team to construct the system.

The team of General Electric Co., Valley Forge, Pa. and Hamilton Standard Division, United Technology Corp., Windsor Locks, Conn. has been selected for negotiating a contract for approximately $7 million to design, fabricate, assemble, install, and test a 1.5 megawatt (1,500 kW) wind turbine electrical generating system in 1978, at a site to be selected by ERDA. The project will be directed for ERDA by Lewis Research Center. The 20-month contract includes an option to build a second wind turbine.

Although experimental in nature, the system will be located at a utility company site and will supply electricity to the local electric system for public use. The purpose of this test system is to determine the economics and operating characteristics of large wind turbines when coupled to conventional power plants.

To be the largest ever built, the windmill will have two slender fiberglass rotor blades spanning 200 feet, perched on a 150-foot tower. The wind turbine will rotate at 30-40 rpm in winds of above 11 mph and will reach its full power output at winds of 22 mph. At a site with average wind speeds of 18 mph, for instance, this machine could produce enough energy annually to supply more than 500 homes.

Most of the contract cost will cover design and engineering. General Electric Co. will be responsible for the overall system design and assembly while the subcontractor, Hamilton Standard will build the rotor blades and hub. Option to build a second 1.5 MW wind turbine is estimated at an additional $2.5 million. If these systems prove successful and can be produced in quantity in the future, their cost is expected to decrease significantly.

Two preliminary design studies performed by General Electric and the Kaman Aerospace Corp. during the past year examined the many concepts and configurations for wind power systems leading to the present design.

Back to school at Ames

COURSES TO BE TELEVISED AUTUMN QUARTER 1976 OVER THE STANFORD INSTRUCTIONAL TELEVISION NETWORK

AERO AND ASTRO				
AA	200A	Engineering Analysis of Flight Vehicles	MWF	9:00 – 9:50
AA	297	Seminar in Flight Control and Guidance	W	4:15 – 5:30
CIVIL ENGINEERING				
		CE 280A WILL NOT BE TELEVISED AUTUMN QUARTER		
COMPUTER SCIENCE				
CS	155	Concrete Mathematics	MWF	3:15 – 4:05
CS	246	Operating Systems	TTh	11:00 – 12:15
CS	265	Computational Models for the Syntax of Natural Language	MWF	9:00 – 9:50
ELECTRICAL ENGINEERING				
EE	181	Introduction to Computer Organization, Machine and Assembly Languages	MWF	1:15 – 2:05
EE	201A	Seminar	Th	11:00 – 11:50
EE	202	Medical Electronics	TTh	3:35 – 4:50
EE	211	Principles of Pulse and Timing Circuits	MWF	10:00 – 10:50
EE	214	Two-Port Network Theory	MWF	8:00 – 8:50
EE	216	Principles and Models of Semiconductor Devices	TTh	8:00 – 9:15
EE	238	Electric and Magnetic Properties of Solids	TTh	1:15 – 2:30
EE	243	Electromagnetic Theory	MWF	10:00 – 10:50
EE	261	The Fourier Transform and Its Applications	MWF	2:15 – 3:05
EE	263	Digital Filtering	MWF	9:00 – 9:50
EE	266	Introduction to Network Synthesis	MWF	8:00 – 8:50
EE	278	Introduction to Statistical Signal Processing	MWF	3:15 – 4:05
EE	286A	Systems Programming	TTh	1:15 – 2:30
EE	322A	Basic Quantum Mechanics	MWF	1:15 – 2:05
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EE	375	Information Systems Seminar	Th	4:15 – 5:30
EE	380	Seminar on Digital Systems	W	4:15 – 5:30
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EES	201A	Dynamic Systems	TTh	9:30 – 10:45
ENGINEERING				
ENGR	105	Control System Analysis and Design	TTh	8:00 – 9:15
ENGR	291	Management of Research Institutions	M	3:15 – 5:05
ENGR	298	Seminar in Fluid Mechanics	T	4:15 – 5:30
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IE	141	Utilization of Computers	MWF	2:15 – 3:05
IE	208	Man–Machine Systems	MWF	10:00 – 10:50
IE	229	Engineering Economy	TTh	2:45 – 4:00
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OP. R.	240	Linear Programming	TTh	4:15 – 5:30
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STAT	116E	Theory of Probability	MWF	11:00 – 11:50
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IES/EPRI ENERGY SEMINARS			M	4:15 – 5:30

For further information and coordination, please contact the Training and Special Programs Branch, Mail Stop 241-3, extension 5623.

Project Orion *(Continued from Page 1)*

from the nearest star, is equivalent to detecting a motion of only 1/20 of an inch at a distance of 40 miles, roughly the distance from Ames to the Golden Gate Bridge. The ability to detect motion on that scale is an order of magnitude beyond present telescopes. The imaging interferometer astrometric telescope designed this summer is capable of measuring the equivalence of only 1 to 3 thousandths of an inch motion at a distance of 40 miles. This instrument would be able to detect Jovian mass planets around most of the stars within 150 light years of the Sun.

An instrument of this sensitivity is able to extend other horizons as well. The cosmological distance scale is established through a chain of distance markers. An important link in that chain, parallax measurements of distance, could be extended nearly two orders of magnitude. The ability to accurately measure the distance to any star within 30,000 light years of the Sun also means that the absolute or intrinsic brightness of all such stars would be precisely determined.

The motivation behind Project Orion can perhaps be best understood by answering the question, "Why is a search for other planetary systems important?" In large measure, the answer to that question is contained in two topics: the origin of the solar system and the existence of extraterrestrial intelligence, which seem at first glance unrelated to one another.

The possible existence of extraterrestrial intelligence (ETI), as with speculation concerning the origin of the solar system, has long piqued man's curiosity. This curiosity has been the basis of a number of science fiction efforts. A graphic demonstration of this fascination with ETI is Orson Welles' radio dramatization in 1939 of the work by H.G. Wells entitled, "War of the Worlds."

Until relatively recently, the subject of ETI had been the plaything of science fiction, and had received no serious consideration in the realm of scientific inquiry. However, Morrison and Cocconi (1959) took the first major step in changing the attitude of the scientific community toward the question of ETI. Their paper pointed out that there is a natural signpost of the electromagnetic spectrum which would be known to any advanced civilization, and that such civilizations might send radio signals at or near the frequency of this natural marker. This signpost is the 21 cm wavelength radiation arising from a hyperline transition in atomic hydrogen, the most abundant element in the universe.

Shortly after the paper by Morrison and Cocconi, Frank Drake conducted a search, known as Project Ozma, for such signals. Drake's search was unsuccessful, but its importance cannot be overlooked, as it was the first serious attempt at detecting ETI signals. The relevance of a SETI (Search for ETI) effort to a search for other planetary systems lies in the fact that the only known intelligent life-form, namely ourselves, developed and was nurtured on a planet. If planets are required for the existence of ETI, knowledge of the frequency of occurrence of planetary systems is clearly highly desirable.

A systematic search for other planetary systems would thus reveal whether there is justification in arguing that a natural, perhaps even causal, relation exists between the phenomenon of star formation, which has occurred some 10^{11} times in the Galaxy, and the existence of ETI. The detection of other planetary systems is difficult; present observational techniques and instrumentation are at best marginal in terms of their ability to carry out such a search.

The purpose of this Design Study was to apply modern technology to the problem in the form of specific design concepts for systems which could successfully mount a search for other planetary systems. The Earth is an object of exquisite beauty, and to the extent that this study is instrumental in the discovery of another such object, it will have served mankind an invaluable service.

More fall courses at ARC

ASSOCIATION FOR CONTINUING EDUCATION – Fall, 1976

Course Title	Day	Start & End Dates	Time
GOLDEN GATE UNIVERSITY MBA PROGRAM			
Management Information Systems	TTh	9/28 – 1/20	7:00 – 8:15 a.m.
Operations Management	M	9/27 – 1/17	4:30 – 7:00 p.m.
Communications & Organizational Behavior	MW	9/27 – 1/19	7:00 – 8:15 a.m.
Planning & Control Systems	TTh	9/28 – 1/20	12:00 – 1:15 p.m.
COLLEGE OF NOTRE DAME MBA FOUNDATION PROGRAM			
(Management Development course denoted by •)			
Management & Organizational Behavior •	M	10/4 – 12/6	5:00 – 6:45 p.m.
Planning & Operations Management •	W	9/29 – 12/8	5:00 – 6:45 p.m.
Principles of Financial Management •	T	9/28 – 12/7	5:00 – 6:45 p.m.
SUPERVISORY SKILLS PROGRAM			
Introduction to Accounting	MW	9/27 – 12/8	12:00 – 1:00 p.m.
Selected Topics in Supervision	T	9/28 – 12/7	5:00 – 6:45 p.m.
Principles of Effective Business Writing	M	9/27 – 12/6	5:15 – 7:00 p.m.
SPECIAL & GENERAL INTEREST PROGRAM			
Introduction to Microcomputers	Th	10/28 – 12/9	5:00 – 7:00 p.m.
Think Metric	MW	9/27 – 11/3	12:00 – 1:00 p.m.
S.I. Metric System	MW	9/27 – 12/8	12:00 – 1:00 p.m.
Fabricating Electronic Subsystems	TTh	9/28 – 12/9	12:00 – 1:00 p.m.
Introduction to Engineering Economy *	TTh	9/28 – 10/28	12:30 – 1:00 p.m.
Introduction to FORTRAN IV	Th	9/30 – 12/9	5:00 – 6:45 p.m.
Basic Algebra	TTh	9/28 – 12/9	12:00 – 1:00 p.m.
Memory Improvement	MW	11/1 – 12/8	12:00 – 1:00 p.m.
Effective Reading *	MW	9/27 – 10/27	12:00 – 1:00 p.m.
Personal Money Management *	MWF	9/27 – 10/22	12:00 – 1:00 p.m.
Financial Planning for Retirement *	MWF	10/25 – 11/19	12:00 – 1:00 p.m.
Communicating Successfully *	F	10/1 – 10/22	12:00 – 1:00 p.m.
Time Management *	TTh	11/2 – 11/18	12:20 – 1:05 p.m.

*Video Tape Program

Any student wishing to apply courses taken for credit through the College of Notre Dame via ACE towards the Business Administration major at the College of Notre Dame should check with the Dean of Continuing Education at CND before enrolling.

ARA ACTIVITIES

GREAT AMERICA – Discount cards for entrance to Great America (10%) are now available at the ARA Store. Tickets are still available at $5.00 for the Moffett Field evening at Great America on September 17. They can be purchased at the ARA Store Mondays, Wednesdays, and Fridays, noon to 12:45.

HELP WANTED:

Bartenders for Happy Hours. Call Judy Long, X5874, if you are interested in tending bar at the ARA Happy Hours.

Volunteers for the Christmas Party. Plans are underway for Ames' annual Christmas Party to be held December 11. We would like to invite all Ames and contractor personnel to help the ARA make this very popular annual event a success again this year. Committees are being formed for raffle ticket sales, entertainment, refreshments and set-up. If you would like to participate in any of these committees or just help out where needed, please call Stan Benbow, Ext. 5639 or the ARA Phone Ext. 5412.

HANG-GLIDING – Super Fly Sky-Sails Inc. of Los Gatos has offered to give a free presentation on Hang-Gliding. The presentation to be given here at Ames some time in the future will include a lecture on the basics of hang-gliding, a training film, a question and answer session and an actual flight simulator will be provided. If you are interested in attending this presentation, please let Phil Thompson, Mail Stop 212-2 know and a date and time will be announced for the presentation soon.

CLUB NEWS

Spotlight on Ames Sportsmen's Club – The Ames Sportmen's Club, formerly the NACA Rod & Gun Club, is probably one of the oldest employee clubs at Ames having been formed when Ames was a part of NACA. The purpose of the club is to promote (1) conservation and preservation of our national wildlife, (2) firearm safety, and (3) increase interest and participation in trap and skeet shooting. The Club is constructing a trap range on the north-east corner of Ames property which should be ready soon. Past activities include training of retriever dogs, duck hunting, pheasant hunting in Willows, Calif., and lots of story telling. All Ames employees and their immediate families and contractor personnel may become members. There are currently 23 active members. Officers for the current year are: President, Jerry Peterson; Vice President, Lew Anderson; Secretary/Treasurer, Jim Diehl. Meetings are normally held during lunch and are open to all. Call any of the officers for more information on club activities and meetings.

Guidance program August 31st

On Tuesday, August 31, from 11:00–1:00 p.m., representatives from the following colleges will be on hand in the cafeteria: DeAnza College, Evergreen Valley College, Foothill College, San Jose City College, San Jose State University, and West Valley College. They will answer questions about the following: admissions, residency, registration, degree and certificate programs, special programs for women, and lots more.

This is a one time, fall term program designed to assist all employees interested in educational, personal or professional growth opportunities.

FREE – Schedule of classes will be available!

De Anza courses

The Training Office plans to offer some Foothill-DeAnza courses at the Center in the Winter Quarter. Watch for an announcement in the Astrogram.

Library notice

Ames Library has available on loan to any employee, "A Working Women's Guide to Her Job Rights," a U.S. Department of Labor, Employment Standards Administration Women's Bureau, Leaflet #55.

Jetsetters' news

10–12 September – THE RENO AIR RACES. Cost $78 per person/double occupancy. Includes transportation, two nights lodging, two days reserved seating, Saturday evening party, $22 value gambling refund. Limited seats available. Contact Marian Davis, ext. 5832, Mail Stop 206-3.

18–19 September – HEARST CASTLE. Cost $39 per person/double occupancy. Includes one night deluxe accommodations, motorcoach transportation from Moffett Field, HEARST CASTLE TOUR, PG&E NUCLEAR PLANT TOUR, continental breakfast, California Host indoor garden wine and hors d'oeuvre party, and California Host escort. Reservations cut-off date – 3 September. Contact Ruthie White, ext. 5157, Mail Stop 206-3. CHECK YOUR BULLETIN BOARDS FOR THIS NOTICE FOR COMPLETE DETAILS.

23–24 October – GOLD COUNTRY.
19–21 November – LAS VEGAS.

Golf

Pajaro Valley Golf Course was in great shape for the Ames Golf Tournament held August 14, 1976. The co-chairmen Elmer Hampel and Bob Barrow ran a mystery partner, best-ball-twosome event with the head pro selecting only 10 holes that counted. Winners on that cloudy and cool day were as follows:

FIRST FLIGHT: 1 – R. Hedlund/D. Banducci; 2 – O. Koontz/J. Lee; 3 – R. Ramos/L. McCulley; nearest the pin on No. 11 – O. Koontz.

SECOND FLIGHT: 1 – P. Quattrone/R. Eddy; 2 – D. Chaussee/H. Mathews; 3 – N. Martin/L. Hockstein; nearest the pin on No. 2 – P. Kutler.

THIRD FLIGHT: 1 – E. Tischler/R. Denison; 2 – F. Wirth/J. McCloy; 3 – V. Oyama/S. Brovarney; nearest the pin on No. 14 – B. Kelley.

FOURTH FLIGHT: 1 – S. Tardio/J. Weyers; 2 – Y. Sheaffer/E. Levin; 3 – R. Sheaffer/K. Bruck; nearest the pin on No. 7 – S. Johnson.

Ames Merit Promotion Plan vacancies

Notice No.	Title	Grade	Org.	Area of Consideration	Closing Date
76-142T	Voucher Examiner	GS-4/5	AFP	Centerwide & Outside	9-3-76
76-143T	Secretary (Typing)	GS-4/5	RFS	Centerwide & Outside	9-3-76
76-144T	Wind Tunnel Mechanic Foreman	WS-11	FAOW	Centerwide	8-27-76
76-145T	Secretary (Typing or stenography)	GS-4/5	LM	Centerwide & Outside	9-3-76

TO APPLY: Call Extension 5599 or 5600.

Want ads

Transportation

FOR SALE: '69 Dodge Dart Htop, 6 cyl., AT, PS, AC, overhauled engine, $775. Call 961-9599 after 5 p.m. or weekend.

- - - - -

For Sale – '68 Chevy Impala, air conditioned, V-8, auto., PS/PB, radio. Excellent condition. $800/offer. Bob Gemmer, 328-8950 eves.

- - - - -

FOR SALE: MATADOR WAGON, 8 seats, 1974, model V8, 33,000 miles, excellent condition, $2950. Phone 739-1651.

- - - - -

For Sale: 1973 Ford Maverick, 46,000 mi., exc. cond., Lux. decor. Grn/white vinyl top. A/T, P/S, $1995 firm. 365-1509 after 5 p.m.

- - - - -

For Sale – 1974 Jensen Healey, color – tangerine, only 7000 miles. Call 327-2428 after 6:30 p.m.

Housing

FOR RENT: Beach house at Pajaro Dunes, completely furnished, beautiful view of Monterey Bay. Reserve now for fall weekends. Call John Lundell, 252-7260.

- - - - -

For Rent: 3 bedroom house near Los Altos High School and convenient to shopping. Extra large livingroom, fireplace, and patio suited to container gardening. Available Sept. 1, $380 per mo. 941-3589.

- - - - -

FOR RENT – New Condo Apt in woodsy area of Palo Alto. Close to fwy. on/off ramps – 10 min from Ames. 2 Bedrooms, 2 bath, AEK, security parking, washer-dryer, sauna, jacuzzi, rec room, private patio and sundeck, w/w carpets, refrig. – $350. Possible lease–sale. Call: 324-1546, 329-1040 evenings only.

- - - - -

WANTED – Room or small apartment for college student working at Ames who is clean and quiet. Charlene 948-8073.

- - - - -

FOR RENT: Swiss Chalet cabin at Lake Tahoe, North Shore in Alpine Meadows, AEK, dishwasher, 2 baths, sleeps 6, reasonable rates by weekend or week, call M. Moore, 739-5373.

HOUSE FOR RENT: Negotiable, responsible people only. Furnished 3 bedroom, 2 bath house in Los Altos. Includes a family room, AEK, 2 fireplaces, washer, dryer, dishwasher. Available on lease: Sept. 76–June 77. No pets. Rent $585/month. Includes gardner and water. Cupertino School District. Large yard. Contact: Lee Neidleman (415)961-5672 evenings and weekends.

Miscellaneous

Need a ride from SJSU. Will share expenses. Betty Wong, ext. 5835 or 294-3266.

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Crib w/mattress, $40, in very good condition. 964-4190.

- - - - -

Olympus – Om-Lens Zuiko 28mm f/3.5. Never used. Included Om lens case and Om lens hood. $125. Contact John Nichols, 736-5280.

- - - - -

Laser sailboat for sale, 1 year old. Excl. cond., like new, light blue, $850/offer. 985-1792.

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Moving Sale: 9x12 Oval Braided Rug (orange/brown), $25; 9x12 blue and green area rug, $10; almost new room humidifier with stand, $20; GM infant car seat, $10; 3-passenger van seat, $25. Call Annette, 259-7419.

- - - - -

Antique sewing machine cabinet (treadle style) w/o the machine! Cute for an end table, conversation piece, dressing room table. Attractive lines. Professionally striped and ready for stain. $50. Call after 5 p.m. 965-0234.

- - - - -

Sofa 8 feet long in gold brocade, v. good cond., neat, clean, good looking. $135. Call: 321-1858.

- - - - -

For Sale: Speakers (pair), Bose 501. Very good condition. Make offer. Phone: 324-8295.

- - - - -

Heavy-duty brown vinyl chair, like new, comfortable, relaxing. $70. Call: 321-1858.

- - - - -

Great Dane, 2 years old, female. Call before 12 a.m. 225-1870 or 252-5596.

- - - - -

Color TV '73 Admiral, mediterranean/Spanish style cabinet. Exc. wkg. cond. $300. 246-9379.

Cubco ski bindings w/toe plates, used 2 seasons, $10. Call 739-5373. Will throw in Kastinger ladies ski boots, 8 M. Good shape.

- - - - -

Free to qualified home: Beautiful, playful, gentle male Boxer. Loves children, is a good watch dog, has papers and has been in some show competition. Also house broken. Paul Laut, (415)967-6403.

- - - - -

Walnut veneer twin bed w/matching chest $125; 10 speed bike $45. 257-0966.

- - - - -

Small antique coffee table with drop leaves approximately 36"x18"x22" in good condition (probably walnut) $20. Call after 5. 739-5373.

- - - - -

FOR SALE: Doughboy Pool (18x32x4 feet) plus pump, D.E. filter, ladder and accessories – All in good condition. Yours for $450 if you remove. Call 244-4632.

- - - - -

Those who wish to help "PET" Inc. (People Ending The Slaughter) by providing foster homes to the animals rescued from the Humane Society, please contact Sandy Pike, President, PET, (408) 244-1951. Also, donations (tax ded.) are needed.

Dental signups

The prepaid dental program for Ames employees will have their open enrollment periods beginning with September 1 and ending with October 1. Those wishing to enroll for an October 1 start-up must have their enrollment material completed by September 15. Those not making that deadline by submitting such enrollment information prior to October 15 will be effective November 1. Enrollment brochures and enrollment cards are available at the training office. Mr. Stark, the representative, will be available to answer questions from 11:30 a.m. to 1:30 p.m. on September 14 and September 15 in Bldg. 241, Rm. 147.

This year the prepaid dental program will include an orthodontic option, details of which will be available with the informational material. Questions will be answered at the meetings. The meetings will be held at available facilities in the training center on the 14th and 15th.

Bloodmobile visit

The American Red Cross Blood Mobile will visit ARC on September 9 between the hours of 8:30 a.m. and 1 p.m. in Bldg. N-239, Life Sciences Research Lab, Room 39 (Basement).

Notice

People stand reminded that the new hours for the Ames Badge Office in Building 241 are from 8a.m. to 3:30 p.m. The doors close at 3:30 p.m., Monday through Friday.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

The Astrogram is an official publication of the Ames Research Center, National Aeronautics and Space Administration, Moffett Field, California, and is published bi-weekly in the interest of Ames employees.

Editor . . . . . Meredith Moore
Associate Editor . . . . Marcia Kadota
Reporters . . . . . NASA Employees

Deadline for contributions: Thursday between publication dates

NASA
National Aeronautics and Space Administration

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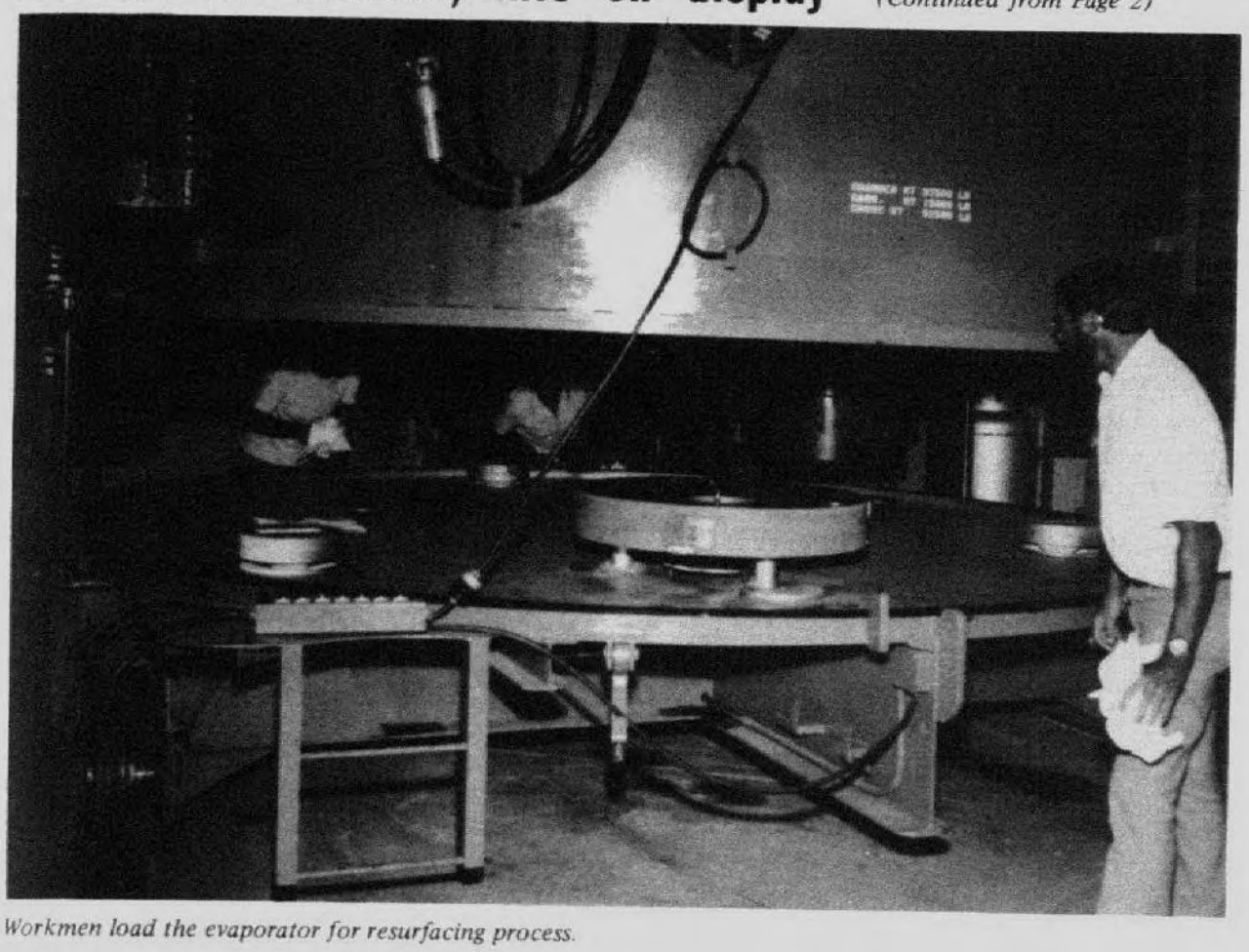
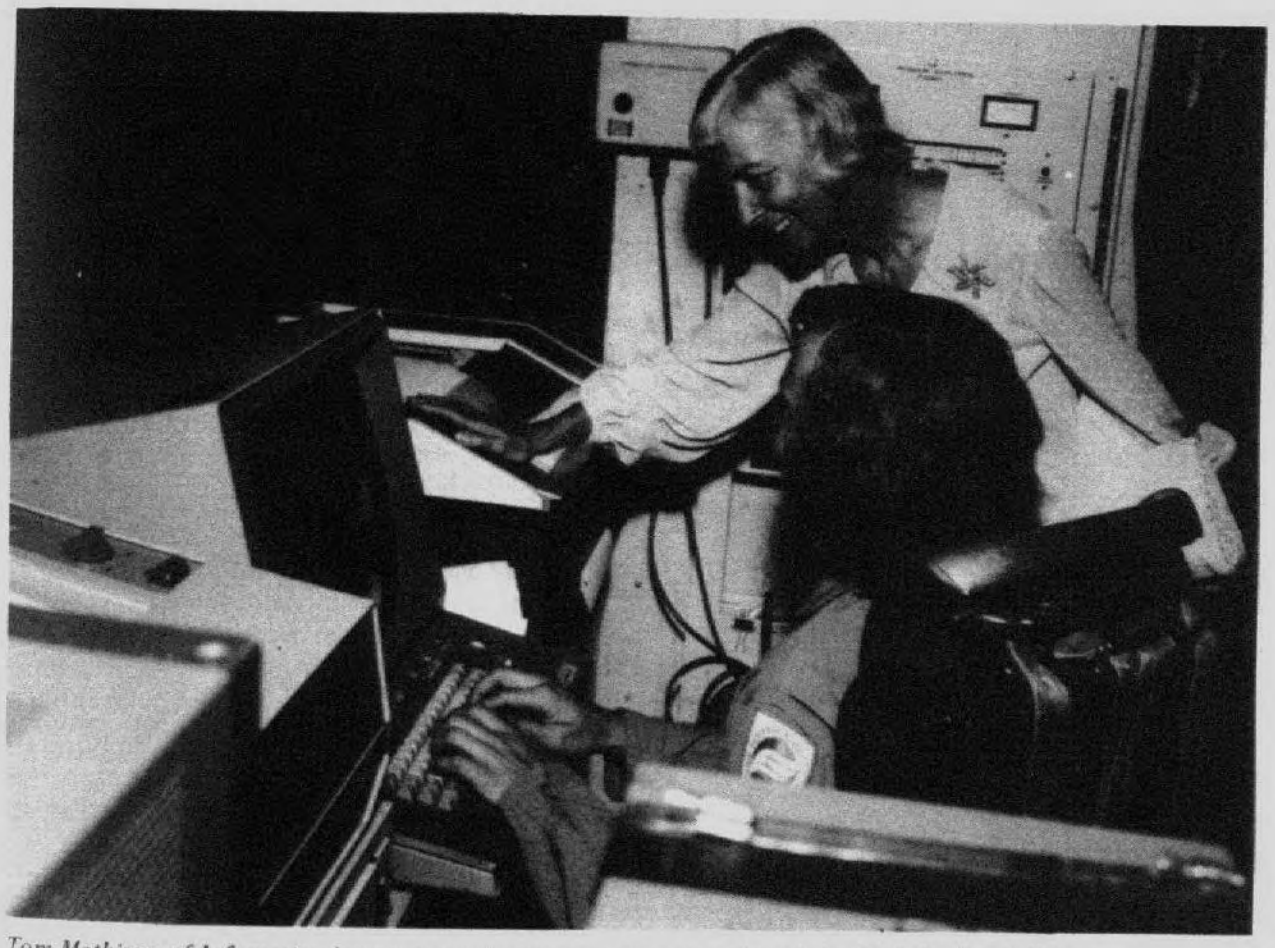
Mirrors are cleaned; KAO on display

(Continued from Page 2)



Workmen load the evaporator for resurfacing process.

Bruce Kelly (Ames) and Randy Meyers (Walter V. Sterling Co.) prepare to reinstall the mirrors.



Tom Mathison of Infomatics demonstrates a computer operation aboard the KAO for Sarah Kuiper.

US/Soviet publication

The three-volume English edition of the joint U.S.-U.S.S.R. "Foundations of Space Biology and Medicine" has been published by the U.S. Government Printing Office.

The Soviet Union previously published a Russian-language version in Moscow.

The publication is the result of several years' work by the U.S.-U.S.S.R. Joint Editorial Board on Space Biology and Medicine, formed in October 1965 by NASA and the Soviet Academy of Sciences. The work summarizes the biological and medical results of the first 15 years of space flight.

NASA, ERDA select team to build largest windmill

The largest windmill in history will be built during the next two years, according to plans of NASA and the Energy Research and Development Administration (ERDA). The two agencies have recently chosen an industrial team to construct the system.

The team of General Electric Co., Valley Forge, Pa. and Hamilton Standard Division, United Technology Corp., Windsor Locks, Conn. has been selected for negotiating a contract for approximately $7 million to design, fabricate, assemble, install, and test a 1.5 megawatt (1,500 kW) wind turbine electrical generating system in 1978, at a site to be selected by ERDA. The project will be directed for ERDA by Lewis Research Center. The 20-month contract includes an option to build a second wind turbine.

Although experimental in nature, the system will be located at a utility company site and will supply electricity to the local electric system for public use. The purpose of this test system is to determine the economics and operating characteristics of large wind turbines when coupled to conventional power plants.

To be the largest ever built, the windmill will have two slender fiberglass rotor blades spanning 200 feet, perched on a 150-foot tower. The wind turbine will rotate at 30-40 rpm in winds of above 11 mph and will reach its full power output at winds of 22 mph. At a site with average wind speeds of 18 mph, for instance, this machine could produce enough energy annually to supply more than 500 homes.

Most of the contract cost will cover design and engineering. General Electric Co. will be responsible for the overall system design and assembly while the subcontractor, Hamilton Standard will build the rotor blades and hub. Option to build a second 1.5 MW wind turbine is estimated at an additional $2.5 million. If these systems prove successful and can be produced in quantity in the future, their cost is expected to decrease significantly.

Two preliminary design studies performed by General Electric and the Kaman Aerospace Corp. during the past year examined the many concepts and configurations for wind power systems leading to the present design.

Back to school at Ames

COURSES TO BE TELEVISED AUTUMN QUARTER 1976 OVER THE STANFORD INSTRUCTIONAL TELEVISION NETWORK

AERO AND ASTRO				
AA	200A	Engineering Analysis of Flight Vehicles	MWF	9:00 – 9:50
AA	297	Seminar in Flight Control and Guidance	W	4:15 – 5:30
CIVIL ENGINEERING				
		CE 280A WILL NOT BE TELEVISED AUTUMN QUARTER		
COMPUTER SCIENCE				
CS	155	Concrete Mathematics	MWF	3:15 – 4:05
CS	246	Operating Systems	TTh	11:00 – 12:15
CS	265	Computational Models for the Syntax of Natural Language	MWF	9:00 – 9:50
ELECTRICAL ENGINEERING				
EE	181	Introduction to Computer Organization, Machine and Assembly Languages	MWF	1:15 – 2:05
EE	201A	Seminar	Th	11:00 – 11:50
EE	202	Medical Electronics	TTh	3:35 – 4:50
EE	211	Principles of Pulse and Timing Circuits	MWF	10:00 – 10:50
EE	214	Two-Port Network Theory	MWF	8:00 – 8:50
EE	216	Principles and Models of Semiconductor Devices	TTh	8:00 – 9:15
EE	238	Electric and Magnetic Properties of Solids	TTh	1:15 – 2:30
EE	243	Electromagnetic Theory	MWF	10:00 – 10:50
EE	261	The Fourier Transform and Its Applications	MWF	2:15 – 3:05
EE	263	Digital Filtering	MWF	9:00 – 9:50
EE	266	Introduction to Network Synthesis	MWF	8:00 – 8:50
EE	278	Introduction to Statistical Signal Processing	MWF	3:15 – 4:05
EE	286A	Systems Programming	TTh	1:15 – 2:30
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IES/EPRI ENERGY SEMINARS			M	4:15 – 5:30

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Project Orion *(Continued from Page 1)*

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The motivation behind Project Orion can perhaps be best understood by answering the question, "Why is a search for other planetary systems important?" In large measure, the answer to that question is contained in two topics: the origin of the solar system and the existence of extraterrestrial intelligence, which seem at first glance unrelated to one another.

The possible existence of extraterrestrial intelligence (ETI), as with speculation concerning the origin of the solar system, has long piqued man's curiosity. This curiosity has been the basis of a number of science fiction efforts. A graphic demonstration of this fascination with ETI is Orson Welles' radio dramatization in 1939 of the work by H.G. Wells entitled, "War of the Worlds."

Until relatively recently, the subject of ETI had been the plaything of science fiction, and had received no serious consideration in the realm of scientific inquiry. However, Morrison and Cocconi (1959) took the first major step in changing the attitude of the scientific community toward the question of ETI. Their paper pointed out that there is a natural signpost of the electromagnetic spectrum which would be known to any advanced civilization, and that such civilizations might send radio signals at or near the frequency of this natural marker. This signpost is the 21 cm wavelength radiation arising from a hyperline transition in atomic hydrogen, the most abundant element in the universe.

Shortly after the paper by Morrison and Cocconi, Frank Drake conducted a search, known as Project Ozma, for such signals. Drake's search was unsuccessful, but its importance cannot be overlooked, as it was the first serious attempt at detecting ETI signals. The relevance of a SETI (Search for ETI) effort to a search for other planetary systems lies in the fact that the only known intelligent life-form, namely ourselves, developed and was nurtured on a planet. If planets are required for the existence of ETI, knowledge of the frequency of occurrence of planetary systems is clearly highly desirable.

A systematic search for other planetary systems would thus reveal whether there is justification in arguing that a natural, perhaps even causal, relation exists between the phenomenon of star formation, which has occurred some 10^{11} times in the Galaxy, and the existence of ETI. The detection of other planetary systems is difficult; present observational techniques and instrumentation are at best marginal in terms of their ability to carry out such a search.

The purpose of this Design Study was to apply modern technology to the problem in the form of specific design concepts for systems which could successfully mount a search for other planetary systems. The Earth is an object of exquisite beauty, and to the extent that this study is instrumental in the discovery of another such object, it will have served mankind an invaluable service.

More fall courses at ARC

ASSOCIATION FOR CONTINUING EDUCATION – Fall, 1976

Course Title	Day	Start & End Dates	Time
GOLDEN GATE UNIVERSITY MBA PROGRAM			
Management Information Systems	TTh	9/28 – 1/20	7:00 – 8:15 a.m.
Operations Management	M	9/27 – 1/17	4:30 – 7:00 p.m.
Communications & Organizational Behavior	MW	9/27 – 1/19	7:00 – 8:15 a.m.
Planning & Control Systems	TTh	9/28 – 1/20	12:00 – 1:15 p.m.
COLLEGE OF NOTRE DAME MBA FOUNDATION PROGRAM			
(Management Development course denoted by •)			
Management & Organizational Behavior •	M	10/4 – 12/6	5:00 – 6:45 p.m.
Planning & Operations Management •	W	9/29 – 12/8	5:00 – 6:45 p.m.
Principles of Financial Management •	T	9/28 – 12/7	5:00 – 6:45 p.m.
SUPERVISORY SKILLS PROGRAM			
Introduction to Accounting	MW	9/27 – 12/8	12:00 – 1:00 p.m.
Selected Topics in Supervision	T	9/28 – 12/7	5:00 – 6:45 p.m.
Principles of Effective Business Writing	M	9/27 – 12/6	5:15 – 7:00 p.m.
SPECIAL & GENERAL INTEREST PROGRAM			
Introduction to Microcomputers	Th	10/28 – 12/9	5:00 – 7:00 p.m.
Think Metric	MW	9/27 – 11/3	12:00 – 1:00 p.m.
S.I. Metric System	MW	9/27 – 12/8	12:00 – 1:00 p.m.
Fabricating Electronic Subsystems	TTh	9/28 – 12/9	12:00 – 1:00 p.m.
Introduction to Engineering Economy *	TTh	9/28 – 10/28	12:30 – 1:00 p.m.
Introduction to FORTRAN IV	Th	9/30 – 12/9	5:00 – 6:45 p.m.
Basic Algebra	TTh	9/28 – 12/9	12:00 – 1:00 p.m.
Memory Improvement	MW	11/1 – 12/8	12:00 – 1:00 p.m.
Effective Reading *	MW	9/27 – 10/27	12:00 – 1:00 p.m.
Personal Money Management *	MWF	9/27 – 10/22	12:00 – 1:00 p.m.
Financial Planning for Retirement *	MWF	10/25 – 11/19	12:00 – 1:00 p.m.
Communicating Successfully *	F	10/1 – 10/22	12:00 – 1:00 p.m.
Time Management *	TTh	11/2 – 11/18	12:20 – 1:05 p.m.

*Video Tape Program

Any student wishing to apply courses taken for credit through the College of Notre Dame via ACE towards the Business Administration major at the College of Notre Dame should check with the Dean of Continuing Education at CND before enrolling.

ARA ACTIVITIES

GREAT AMERICA – Discount cards for entrance to Great America (10%) are now available at the ARA Store. Tickets are still available at $5.00 for the Moffett Field evening at Great America on September 17. They can be purchased at the ARA Store Mondays, Wednesdays, and Fridays, noon to 12:45.

HELP WANTED:

Bartenders for Happy Hours. Call Judy Long, X5874, if you are interested in tending bar at the ARA Happy Hours.

Volunteers for the Christmas Party. Plans are underway for Ames' annual Christmas Party to be held December 11. We would like to invite all Ames and contractor personnel to help the ARA make this very popular annual event a success again this year. Committees are being formed for raffle ticket sales, entertainment, refreshments and set-up. If you would like to participate in any of these committees or just help out where needed, please call Stan Benbow, Ext. 5639 or the ARA Phone Ext. 5412.

HANG-GLIDING – Super Fly Sky-Sails Inc. of Los Gatos has offered to give a free presentation on Hang-Gliding. The presentation to be given here at Ames some time in the future will include a lecture on the basics of hang-gliding, a training film, a question and answer session and an actual flight simulator will be provided. If you are interested in attending this presentation, please let Phil Thompson, Mail Stop 212-2 know and a date and time will be announced for the presentation soon.

CLUB NEWS

Spotlight on Ames Sportsmen's Club – The Ames Sportmen's Club, formerly the NACA Rod & Gun Club, is probably one of the oldest employee clubs at Ames having been formed when Ames was a part of NACA. The purpose of the club is to promote (1) conservation and preservation of our national wildlife, (2) firearm safety, and (3) increase interest and participation in trap and skeet shooting. The Club is constructing a trap range on the north-east corner of Ames property which should be ready soon. Past activities include training of retriever dogs, duck hunting, pheasant hunting in Willows, Calif., and lots of story telling. All Ames employees and their immediate families and contractor personnel may become members. There are currently 23 active members. Officers for the current year are: President, Jerry Peterson; Vice President, Lew Anderson; Secretary/Treasurer, Jim Diehl. Meetings are normally held during lunch and are open to all. Call any of the officers for more information on club activities and meetings.

Guidance program August 31st

On Tuesday, August 31, from 11:00–1:00 p.m., representatives from the following colleges will be on hand in the cafeteria: DeAnza College, Evergreen Valley College, Foothill College, San Jose City College, San Jose State University, and West Valley College. They will answer questions about the following: admissions, residency, registration, degree and certificate programs, special programs for women, and lots more.

This is a one time, fall term program designed to assist all employees interested in educational, personal or professional growth opportunities.

FREE – Schedule of classes will be available!

De Anza courses

The Training Office plans to offer some Foothill-DeAnza courses at the Center in the Winter Quarter. Watch for an announcement in the Astrogram.

Library notice

Ames Library has available on loan to any employee, "A Working Women's Guide to Her Job Rights," a U.S. Department of Labor, Employment Standards Administration Women's Bureau, Leaflet #55.

Jetsetters' news

10–12 September – THE RENO AIR RACES. Cost $78 per person/double occupancy. Includes transportation, two nights lodging, two days reserved seating, Saturday evening party, $22 value gambling refund. Limited seats available. Contact Marian Davis, ext. 5832, Mail Stop 206-3.

18–19 September – HEARST CASTLE. Cost $39 per person/double occupancy. Includes one night deluxe accommodations, motorcoach transportation from Moffett Field, HEARST CASTLE TOUR, PG&E NUCLEAR PLANT TOUR, continental breakfast, California Host indoor garden wine and hors d'oeuvre party, and California Host escort. Reservations cut-off date – 3 September. Contact Ruthie White, ext. 5157, Mail Stop 206-3. CHECK YOUR BULLETIN BOARDS FOR THIS NOTICE FOR COMPLETE DETAILS.

23–24 October – GOLD COUNTRY.
19–21 November – LAS VEGAS.

Golf

Pajaro Valley Golf Course was in great shape for the Ames Golf Tournament held August 14, 1976. The co-chairmen Elmer Hampel and Bob Barrow ran a mystery partner, best-ball-twosome event with the head pro selecting only 10 holes that counted. Winners on that cloudy and cool day were as follows:

FIRST FLIGHT: 1 – R. Hedlund/D. Banducci; 2 – O. Koontz/J. Lee; 3 – R. Ramos/L. McCulley; nearest the pin on No. 11 – O. Koontz.

SECOND FLIGHT: 1 – P. Quattrone/R. Eddy; 2 – D. Chaussee/H. Mathews; 3 – N. Martin/L. Hockstein; nearest the pin on No. 2 – P. Kutler.

THIRD FLIGHT: 1 – E. Tischler/R. Denison; 2 – F. Wirth/J. McCloy; 3 – V. Oyama/S. Brovarney; nearest the pin on No. 14 – B. Kelley.

FOURTH FLIGHT: 1 – S. Tardio/J. Weyers; 2 – Y. Sheaffer/E. Levin; 3 – R. Sheaffer/K. Bruck; nearest the pin on No. 7 – S. Johnson.

Ames Merit Promotion Plan vacancies

Notice No.	Title	Grade	Org.	Area of Consideration	Closing Date
76-142T	Voucher Examiner	GS-4/5	AFP	Centerwide & Outside	9-3-76
76-143T	Secretary (Typing)	GS-4/5	RFS	Centerwide & Outside	9-3-76
76-144T	Wind Tunnel Mechanic Foreman	WS-11	FAOW	Centerwide	8-27-76
76-145T	Secretary (Typing or stenography)	GS-4/5	LM	Centerwide & Outside	9-3-76

TO APPLY: Call Extension 5599 or 5600.

Want ads

Transportation

FOR SALE: '69 Dodge Dart Htop, 6 cyl., AT, PS, AC, overhauled engine, $775. Call 961-9599 after 5 p.m. or weekend.

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For Sale – '68 Chevy Impala, air conditioned, V-8, auto., PS/PB, radio. Excellent condition. $800/offer. Bob Gemmer, 328-8950 eves.

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FOR SALE: MATADOR WAGON, 8 seats, 1974, model V8, 33,000 miles, excellent condition, $2950. Phone 739-1651.

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For Sale: 1973 Ford Maverick, 46,000 mi., exc. cond., Lux. decor. Grn/white vinyl top. A/T, P/S, $1995 firm. 365-1509 after 5 p.m.

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For Sale – 1974 Jensen Healey, color – tangerine, only 7000 miles. Call 327-2428 after 6:30 p.m.

Housing

FOR RENT: Beach house at Pajaro Dunes, completely furnished, beautiful view of Monterey Bay. Reserve now for fall weekends. Call John Lundell, 252-7260.

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For Rent: 3 bedroom house near Los Altos High School and convenient to shopping. Extra large livingroom, fireplace, and patio suited to container gardening. Available Sept. 1, $380 per mo. 941-3589.

- - - - -

FOR RENT – New Condo Apt in woodsy area of Palo Alto. Close to fwy. on/off ramps – 10 min from Ames. 2 Bedrooms, 2 bath, AEK, security parking, washer-dryer, sauna, jacuzzi, rec room, private patio and sundeck, w/w carpets, refrig. – $350. Possible lease–sale. Call: 324-1546, 329-1040 evenings only.

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WANTED – Room or small apartment for college student working at Ames who is clean and quiet. Charlene 948-8073.

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FOR RENT: Swiss Chalet cabin at Lake Tahoe, North Shore in Alpine Meadows, AEK, dishwasher, 2 baths, sleeps 6, reasonable rates by weekend or week, call M. Moore, 739-5373.

HOUSE FOR RENT: Negotiable, responsible people only. Furnished 3 bedroom, 2 bath house in Los Altos. Includes a family room, AEK, 2 fireplaces, washer, dryer, dishwasher. Available on lease: Sept. 76–June 77. No pets. Rent $585/month. Includes gardner and water. Cupertino School District. Large yard. Contact: Lee Neidleman (415)961-5672 evenings and weekends.

Miscellaneous

Need a ride from SJSU. Will share expenses. Betty Wong, ext. 5835 or 294-3266.

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Crib w/mattress, $40, in very good condition. 964-4190.

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Olympus – Om-Lens Zuiko 28mm f/3.5. Never used. Included Om lens case and Om lens hood. $125. Contact John Nichols, 736-5280.

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Laser sailboat for sale, 1 year old. Excl. cond., like new, light blue. $850/offer. 985-1792.

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Moving Sale: 9x12 Oval Braided Rug (orange/brown), $25; 9x12 blue and green area rug, $10; almost new room humidifier with stand, $20; GM infant car seat, $10; 3-passenger van seat, $25. Call Annette, 259-7419.

- - - - -

Antique sewing machine cabinet (treadle style) w/o the machine! Cute for an end table, conversation piece, dressing room table. Attractive lines. Professionally striped and ready for stain. $50. Call after 5 p.m. 965-0234.

- - - - -

Sofa 8 feet long in gold brocade, v. good cond., neat, clean, good looking. $135. Call: 321-1858.

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For Sale: Speakers (pair), Bose 501. Very good condition. Make offer. Phone: 324-8295.

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Heavy-duty brown vinyl chair, like new, comfortable, relaxing. $70. Call: 321-1858.

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Great Dane, 2 years old, female. Call before 12 a.m. 225-1870 or 252-5596.

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Color TV '73 Admiral, mediterranean/Spanish style cabinet. Exc. wkg. cond. $300. 246-9379.

Cubco ski bindings w/toe plates, used 2 seasons, $10. Call 739-5373. Will throw in Kastinger ladies ski boots, 8 M. Good shape.

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Free to qualified home: Beautiful, playful, gentle male Boxer. Loves children, is a good watch dog, has papers and has been in some show competition. Also house broken. Paul Laut, (415)967-6403.

- - - - -

Walnut veneer twin bed w/matching chest $125; 10 speed bike $45. 257-0966.

- - - - -

Small antique coffee table with drop leaves approximately 36"x18"x22" in good condition (probably walnut) $20. Call after 5. 739-5373.

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FOR SALE: Doughboy Pool (18x32x4 feet) plus pump, D.E. filter, ladder and accessories – All in good condition. Yours for $450 if you remove. Call 244-4632.

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Those who wish to help "PET" Inc. (People Ending The Slaughter) by providing foster homes to the animals rescued from the Humane Society, please contact Sandy Pike, President, PET, (408) 244-1951. Also, donations (tax ded.) are needed.

Dental signups

The prepaid dental program for Ames employees will have their open enrollment periods beginning with September 1 and ending with October 1. Those wishing to enroll for an October 1 start-up must have their enrollment material completed by September 15. Those not making that deadline by submitting such enrollment information prior to October 15 will be effective November 1. Enrollment brochures and enrollment cards are available at the training office. Mr. Stark, the representative, will be available to answer questions from 11:30 a.m. to 1:30 p.m. on September 14 and September 15 in Bldg. 241, Rm. 147.

This year the prepaid dental program will include an orthodontic option, details of which will be available with the informational material. Questions will be answered at the meetings. The meetings will be held at available facilities in the training center on the 14th and 15th.

Bloodmobile visit

The American Red Cross Blood Mobile will visit ARC on September 9 between the hours of 8:30 a.m. and 1 p.m. in Bldg. N-239, Life Sciences Research Lab, Room 39 (Basement).

Notice

People stand reminded that the new hours for the Ames Badge Office in Building 241 are from 8a.m. to 3:30 p.m. The doors close at 3:30 p.m., Monday through Friday.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

The Astrogram is an official publication of the Ames Research Center, National Aeronautics and Space Administration, Moffett Field, California, and is published bi-weekly in the interest of Ames employees.

Editor . . . . . Meredith Moore
Associate Editor . . . . Marcia Kadota
Reporters . . . . . NASA Employees

Deadline for contributions: Thursday between publication dates

NASA
National Aeronautics and Space Administration

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The Astrogram

VOLUME XVIII NUMBER 26 September 9, 1976

What if?

Excerpted from an address by Dr. James C. Fletcher, NASA Administrator, at the Conference on Selected Technology for the Gas Industry, Lewis Research Center, Cleveland, Ohio.

Planetary exploration is the least understood yet probably the most crucial aspect of the U.S. space program. In an economic age, when space research and technology is measured by its immediate value in the marketplace, studies of the planets often are considered to be little more than an exercise in intellectual curiosity. Nothing could be farther from the truth. Exploration of the planets is the basic research that provides the motivation and the tools to produce the tangible benefits of tomorrow.

Let me illustrate. One of the most stirring and rewarding space missions ever undertaken was Pioneer 10's amazing voyage to Jupiter. From the beginning, the mission was beset by a series of imponderables. For instance, designers were asked to come up with a lightweight spacecraft capable of functioning near perfectly for up to seven years in the hostile reaches of deep space at distances of almost 2 billion miles from Earth. Yet, it had to be sturdy enough to withstand the rigors of liftoff and unheard-of speeds around 100,000 miles per hour. The spacecraft's instrument package had to be able to survive impacts from micrometeoroids, temperatures of more than 200 degrees below zero and radiation levels thousands of times greater than anything ever experienced before. Furthermore, the spacecraft's power supply would have to be nuclear generated since solar cells that convert sunlight to electricity would be useless at distances hundreds of millions of miles from the Sun.

Mission planners faced an equally demanding task. To reach Jupiter, a spacecraft would have to leapfrog from a moving Earth along a 620-million-mile arc to catch up with the giant planet as it whizzed in orbit about the Sun. Targeting must be precise enough to bring it to within 81,000 miles of the planet's cloud tops.

Tracking and communications problems at Jupiter distances and beyond figured to be near-impossible. A command to the spacecraft would take 46 minutes to get there at the speed of light, which is 186,000 miles a second. Ground controllers would have to wait another 46 minutes to find out if the spacecraft responded to the command. Also, since all communication between the Earth and the spacecraft was straight-line, that is, antenna-to-antenna, the ever-changing orbital positions of Earth and Jupiter had to be taken into account.

Well, Pioneer 10 pulled it off. After a journey of 22 months and 620 million miles, it skimmed past Jupiter's cloud tops at an altitude of 81,000 miles, just as planned. And it got there less than one minute off its scheduled arrival time.

Portions of the data sent back by Pioneer were fed into waiting computers and converted into color images for viewing. Normally, the images would be blurred because of the spacecraft's angle of approach to Jupiter and the planet's rotation. Furthermore, data lost in transmission would appear as holes or blank spots in the image. We got around

(Continued on Page 2)

Ames' first female aircraft mechanic

Richard Lee guides aircraft mechanic trainee Maria-Elena Sanchez with information on maintaining an Ames helicopter.

For the past eight months, Ames has had a co-op student from the College of San Mateo (CSM) working as an aircraft mechanic trainee in the Aircraft Services Branch. The student trainee is Maria-Elena Sanchez and she is one of about four females enrolled in CSM's Airframe and Power Plant Mechanics; the program's total enrollment runs close to two hundred.

In her role as a mechanic at ARC, Maria-Elena performs general maintenance and up-keep work on the Lear jets and the Cesna 402. She also fuels up these aircraft. She feels that her experience at Ames has offered an invaluable opportunity to learn aircraft mechanics in a hands-on program. Maria-Elena receives both college credit and monetary compensation for her work at Ames.

When asked how she first became interested in joining the CSM aircraft mechanics program, Maria-Elena answered that though she had never had an unusual amount of exposure to any mechanics as a youth, she had always been somewhat interested in the field. Being mechanically inclined, Maria-Elena holds a Commercial Pilot's license and has been flying since 1971. She flies as often as she can and truly enjoys the experience.

The CSM Airframe and Power Plant Mechanics Program will lead one to a license in Airframe and Power Plant Mechanics. To complete the program, a person must attend an FAA (Federal Aviation Administration) approved school, such as CSM, for approximately 30 months; one must then pass a written, oral, and practical test to finally receive the license.

Other popular "A and P" schools in the area offering this program include California State University at San Jose and Palo Alto Adult Education (night school).

(Continued on Page 3)

Hispanic Heritage Week at Ames

Center Director Dr. Hans Mark has announced that Ames will celebrate Hispanic Heritage Week from September 20 through September 24, 1976. All personnel at Ames are invited to attend the special events which are being planned for that week. The theme will be "Sharing of Culture."

Special Programs have been arranged and will be held in Building 245 Auditorium and the Ames Cafeteria, and are as follows:

Monday, September 20, from 1:00–3:00 p.m., Audio-Visual Cultural Happening, and also a Hispanic Historical presentation (Bldg. 245 Aud.)

Wednesday, September 22, from 11:30 a.m. to 1:00 p.m., a series of films observing Hispanic Culture (Bldg. 245 Aug.)

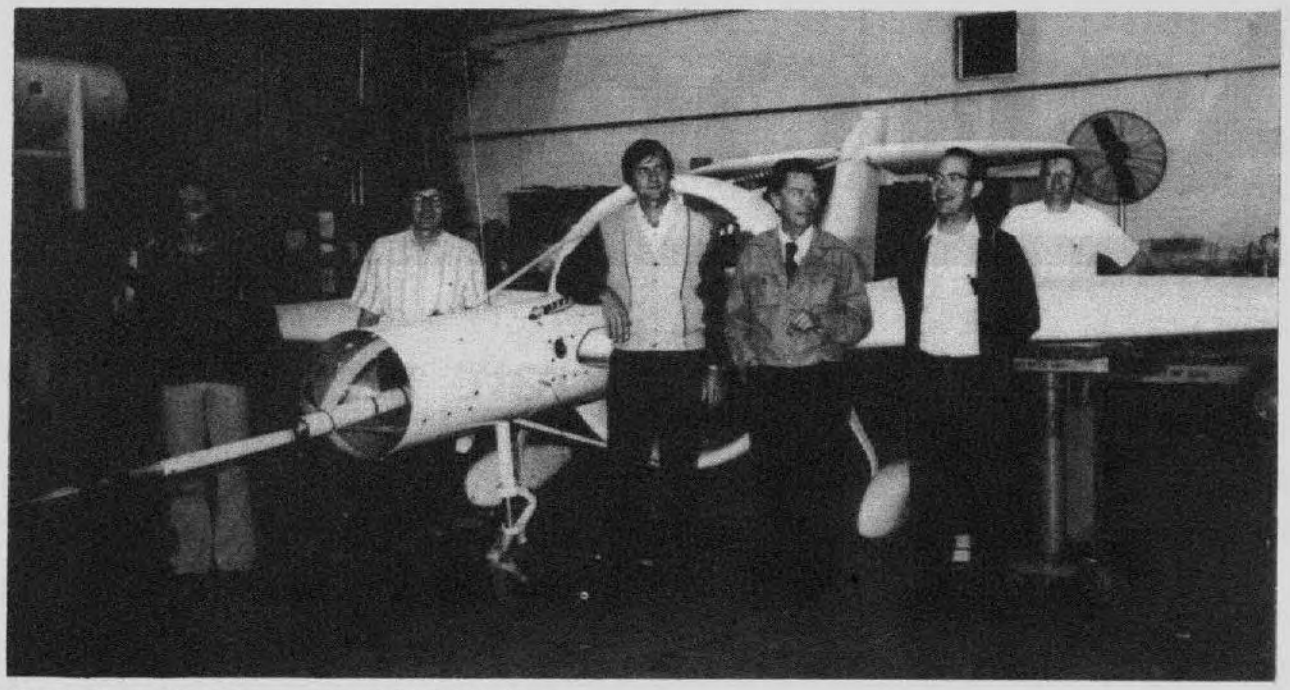
Friday, September 24, from 4:30 to 6:30 p.m., there will be a Happy Hour in the Ames Cafeteria. Festivities will consist of Mexican folk dancers, a Mariachi group, Mexican hors d'oeuvres, and drink.

In addition, the week-long celebration will include for your aesthetic enjoyment an impressive Art Exhibit in the Ames Library. Also, the Ames Cafeteria will lend its culinary imagination to enhance the events of the week.

In proclaiming National Hispanic Heritage Week, President Ford said, "We can look forward to discovering other contributions from the Hispanic civilization so long and well-established in our land, and from millions of Americans of Hispanic origin who enrich our society."

Todos bienvenidos (Everyone is welcome!!)

Ames' part in successful oblique flight



Happy faces after Oblique Wing RPA Flight Test.

Left to Right – Dr. Gordon Harris, Designer from Developmental Sciences; Rod Bailey, Program Manager, Ames; Jim Martin, Pilot from Ames; Dr. R. T. Jones, Concept Inventor from Ames; Dick Fisher, Project Engineer, Dryden; and Gary Layton, Project Manager, Dryden.

As noted in an earlier Astrogram, on August 6 a team of people from Ames and Dryden Flight Research Centers flew a unique oblique wing aircraft with a remote pilot. It was the first completely remotely piloted flight operation from DFRC in which takeoff, flight test, and landing were all accomplished with the pilot in a remote van. It also was the first instrumented flight of an oblique winged aircraft.

Pilot Jim Martin of Ames operated the vehicle using a television scene provided by a nose camera and transmitted to the remote pilot van. Martin used a side-kick controller, the television picture, plus instruments to complete the total flight.

Gary Layton of Dryden was the flight engineer and monitored the RPV telemetered instrument readings in the van beside Martin. The flight test lasted 24 minutes and was witnessed by a full control room of people including Dave Scott, the Director of Dryden Flight Research Center, as well as a contingent from Ames who made an early morning flight to DFRC to witness the 6:15 a.m. takeoff.

Jack Boyd, Deputy Director of Aeronautics and Flight Systems, headed the group that included Dick Petersen, R. T. Jones, Tom Gregory, Ron Smith, and Paul Harper from Ames Research Center.

Rod Bailey, the program manager from ARC, monitored the flight operations and test equipment from the control room with the assistance of Ron Smith. Jim Martin and Rod Bailey had been at DFRC for many weeks before the flight practicing the mission with flight simulators and a light aircraft with television cameras on board. Their diligence and skill paid off in a successful flight in which the wing of the unique airplane was rotated fifteen degrees so that flight test data could be obtained to compare with wind tunnel and simulation results.

The oblique winged remotely piloted aircraft weighs approximately 900 lb and has a 22-ft wing span. The vehicle is used to verify the aerodynamic characteristics of oblique winged aircraft and to compare and understand the dynamic characteristics of this concept which was invented by Dr. R. T. Jones of Ames. The concept has been under study at Ames for a number of years and the efforts have included system studies of civil transports as well as a variety of military aircraft. The efforts included wind tunnel studies of many vehicle configurations and the oblique winged RPV flight test program. Pres Nelms of Ames will present a comprehensive survey paper covering the technology program at the AIAA Aircraft System Technology Conference to be held at Dallas, September 24, 1976.

The technology program has demonstrated that the oblique winged concept has lower drag at high speeds than conventional swept wing or conventional variable sweep wing configurations. The program has systematically reduced the uncertainty regarding the aerodynamic performance, stability and control, and now the flight characteristics of such vehicles. In civilian applications, the vehicle concept promises supersonic transport capability without sonic boom and the flexibility to fly at high speeds with good economy and at lower speeds with excellent fuel efficiency. The wing concept has also been shown to be effective for cruise missile applications as well as other military functions.

The oblique winged RPV project was a unique team effort in which Flight Research Center took full responsibility for assuring a successful flight test program after ARC originated the concept, designed and built the vehicle under contract, and then wind tunnel tested and simulated the vehicles at Ames. Rod Bailey has had full responsibility for the program from its conceptual stage through the wind tunnel test, simulation and flight test. Bailey's responsibilities often extended to the white suit and wrench category when the vehicle was tested on the ground and in the 40- by 80-ft wind tunnel. During that period last winter the project caught the attention of many people including Ames Safety Officer Lew Hughes who dispatched a team to measure the noise level from the 4-cylinder, 90-horsepower McCulloch drone engine. Bailey and his test team of Paul Harper and Pete Putman (U.S. Army) had the privilege of working the swing shift after Dr. Hughes' tests indicated the noise levels didn't fit even the Ames Research Center environment.

After the vehicle was moved to Dryden Flight Research Center for further simulation and flight test planning, the DFRC team made significant changes in the onboard and ground equipment to assure the vehicle safety and make it compatible with the DFRC facilities. Dick Fisher and Gary Layton of DFRC headed the DFRC team that tackled the joint project with real enthusiasm. Jim Martin, the Ames pilot, and Einar Enevoldson, a DFRC pilot with experience in remote piloting the 3/8-scale F-15, conducted a number of practice flights with the twin Piper Comanche. This aircraft is equipped with a television camera and data link similar to the RPV and is flown with an onboard check pilot. Martin made over 30 take-offs and landings with this system before trying the oblique winged RPV with no check pilot on board.

Martin relates that remote piloting the unique RPV demanded his full attention and could be characterized as "intense." During the lift-off maneuver the vehicle rotated more than expected so that the horizon on the television screen went below the field of view. A few tense moments later it reappeared and the vehicle bounced on the runway before Martin got it on the nominal climb path. All the spectators in the Dryden control room viewed the same television scene that the pilot saw and shared some of the "intensity."

A few moments later Martin requested the pitch auto pilot be engaged and the television screen displayed a classical unstable condition as the horizon oscillated up and down with increasing magnitude. The pilot coolly took manual control and then requested another check of the auto pilot at higher speed. The same response was viewed and the decision was made to limit wing oblique positions to a maximum of 15°. After several test points were accomplished, Martin landed the vehicle very softly with the wing in the 0° position. The shadow of vehicle was in the picture as touchdown was approached, and gave the control-room crowd a clear indication that the vehicle landed safely. The Ames pilot did an excellent job during the flight and the DFRC crew did a thoroughly professional job.

The next flight is scheduled for September 16 and wing oblique positions up to 45° are planned.

Shuttle roll-out

Roll-out of the first Space Shuttle Orbiter will occur on Sept. 17, 1976, at the NASA/Rockwell International Space Division facility, Palmdale, Calif.

A ceremony to mark this milestone in the nation's future Space Transportation System will take place at 9:30 a.m. PDT. Media representatives are invited to attend.

Press facilities will be available on site for radio, television and print coverage.

What if? *(Continued from Page 1)*

this through a process called computer enhancement, which automatically compensated for all motions and filled in the missing holes cosmetically with the best possible substitute. The final result was a color image of amazing clarity and detail, the first close-up views ever obtained of mighty Jupiter.

You might be interested to know that Pioneer 10 is still "talking" to us with its eight-watt transmitter from a distance of almost a billion miles. We expect to hear its message until around August 1979, when it intersects the orbit of Uranus, still another 800 million miles farther along. I should also mention that Pioneer 11, which followed Pioneer 10's track a year later, performed even better. It flew within 29,000 miles of Jupiter and is now swinging towards Saturn, hopefully to give us our first close-up look at this mysterious world with rings around it.

It does not take much imagination to visualize the technology spawned by our curiosity about Jupiter. Apart from our findings about the solar system's largest world, which were significant and helped us to understand more about the Earth, the advancements in design, materials, reliability, power sources and communications necessary for such a venture are filtering down even now into business, industry and home.

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

NASA

The Astrogram

VOLUME XVIII NUMBER 26

September 9, 1976

What if?

Excerpted from an address by Dr. James C. Fletcher, NASA Administrator, at the Conference on Selected Technology for the Gas Industry, Lewis Research Center, Cleveland, Ohio.

Planetary exploration is the least understood yet probably the most crucial aspect of the U.S. space program. In an economic age, when space research and technology is measured by its immediate value in the marketplace, studies of the planets often are considered to be little more than an exercise in intellectual curiosity. Nothing could be farther from the truth. Exploration of the planets is the basic research that provides the motivation and the tools to produce the tangible benefits of tomorrow.

Let me illustrate. One of the most stirring and rewarding space missions ever undertaken was Pioneer 10's amazing voyage to Jupiter. From the beginning, the mission was beset by a series of imponderables. For instance, designers were asked to come up with a lightweight spacecraft capable of functioning near perfectly for up to seven years in the hostile reaches of deep space at distances of almost 2 billion miles from Earth. Yet, it had to be sturdy enough to withstand the rigors of liftoff and unheard-of speeds around 100,000 miles per hour. The spacecraft's instrument package had to be able to survive impacts from micrometeoroids, temperatures of more than 200 degrees below zero and radiation levels thousands of times greater than anything ever experienced before. Furthermore, the spacecraft's power supply would have to be nuclear generated since solar cells that convert sunlight to electricity would be useless at distances hundreds of millions of miles from the Sun.

Mission planners faced an equally demanding task. To reach Jupiter, a spacecraft would have to leapfrog from a moving Earth along a 620-million-mile arc to catch up with the giant planet as it whizzed in orbit about the Sun. Targeting must be precise enough to bring it to within 81,000 miles of the planet's cloud tops.

Tracking and communications problems at Jupiter distances and beyond figured to be near-impossible. A command to the spacecraft would take 46 minutes to get there at the speed of light, which is 186,000 miles a second. Ground controllers would have to wait another 46 minutes to find out if the spacecraft responded to the command. Also, since all communication between the Earth and the spacecraft was straight-line, that is, antenna-to-antenna, the ever-changing orbital positions of Earth and Jupiter had to be taken into account.

Well, Pioneer 10 pulled it off. After a journey of 22 months and 620 million miles, it skimmed past Jupiter's cloud tops at an altitude of 81,000 miles, just as planned. And it got there less than one minute off its scheduled arrival time.

Portions of the data sent back by Pioneer were fed into waiting computers and converted into color images for viewing. Normally, the images would be blurred because of the spacecraft's angle of approach to Jupiter and the planet's rotation. Furthermore, data lost in transmission would appear as holes or blank spots in the image. We got around

(Continued on Page 2)

Ames' first female aircraft mechanic

Richard Lee guides aircraft mechanic trainee Maria-Elena Sanchez with information on maintaining an Ames helicopter.

For the past eight months, Ames has had a co-op student from the College of San Mateo (CSM) working as an aircraft mechanic trainee in the Aircraft Services Branch. The student trainee is Maria-Elena Sanchez and she is one of about four females enrolled in CSM's Airframe and Power Plant Mechanics; the program's total enrollment runs close to two hundred.

In her role as a mechanic at ARC, Maria-Elena performs general maintenance and up-keep work on the Lear jets and the Cesna 402. She also fuels up these aircraft. She feels that her experience at Ames has offered an invaluable opportunity to learn aircraft mechanics in a hands-on program. Maria-Elena receives both college credit and monetary compensation for her work at Ames.

When asked how she first became interested in joining the CSM aircraft mechanics program, Maria-Elena answered that though she had never had an unusual amount of exposure to any mechanics as a youth, she had always been somewhat interested in the field. Being mechanically inclined, Maria-Elena holds a Commercial Pilot's license and has been flying since 1971. She flies as often as she can and truly enjoys the experience.

The CSM Airframe and Power Plant Mechanics Program will lead one to a license in Airframe and Power Plant Mechanics. To complete the program, a person must attend an FAA (Federal Aviation Administration) approved school, such as CSM, for approximately 30 months; one must then pass a written, oral, and practical test to finally receive the license.

Other popular "A and P" schools in the area offering this program include California State University at San Jose and Palo Alto Adult Education (night school).

(Continued on Page 3)

Hispanic Heritage Week at Ames

Center Director Dr. Hans Mark has announced that Ames will celebrate Hispanic Heritage Week from September 20 through September 24, 1976. All personnel at Ames are invited to attend the special events which are being planned for that week. The theme will be "Sharing of Culture."

Special Programs have been arranged and will be held in Building 245 Auditorium and the Ames Cafeteria, and are as follows:

Monday, September 20, from 1:00–3:00 p.m., Audio-Visual Cultural Happening, and also a Hispanic Historical presentation (Bldg. 245 Aud.)

Wednesday, September 22, from 11:30 a.m. to 1:00 p.m., a series of films observing Hispanic Culture (Bldg. 245 Aug.)

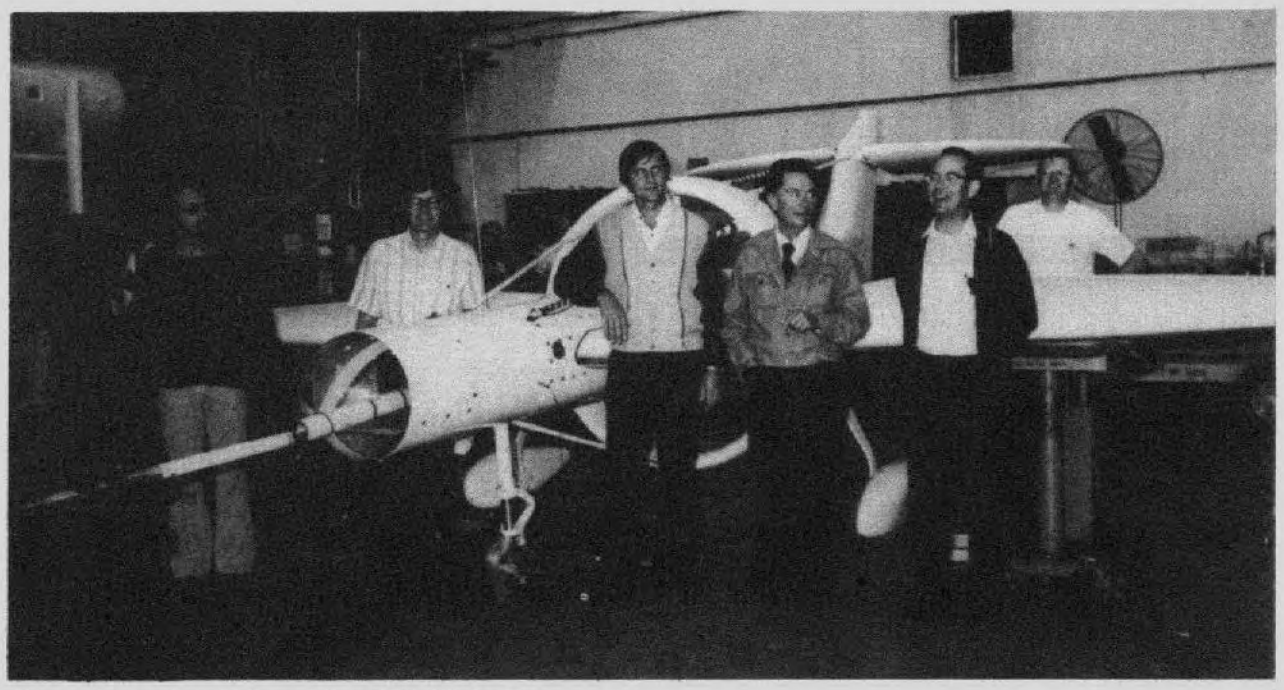
Friday, September 24, from 4:30 to 6:30 p.m., there will be a Happy Hour in the Ames Cafeteria. Festivities will consist of Mexican folk dancers, a Mariachi group, Mexican hors d'oeuvres, and drink.

In addition, the week-long celebration will include for your aesthetic enjoyment an impressive Art Exhibit in the Ames Library. Also, the Ames Cafeteria will lend its culinary imagination to enhance the events of the week.

In proclaiming National Hispanic Heritage Week, President Ford said, "We can look forward to discovering other contributions from the Hispanic civilization so long and well-established in our land, and from millions of Americans of Hispanic origin who enrich our society."

Todos bienvenidos (Everyone is welcome!!)

Ames' part in successful oblique flight



Happy faces after Oblique Wing RPA Flight Test.

Left to Right – Dr. Gordon Harris, Designer from Developmental Sciences; Rod Bailey, Program Manager, Ames; Jim Martin, Pilot from Ames; Dr. R. T. Jones, Concept Inventor from Ames; Dick Fisher, Project Engineer, Dryden; and Gary Layton, Project Manager, Dryden.

As noted in an earlier Astrogram, on August 6 a team of people from Ames and Dryden Flight Research Centers flew a unique oblique wing aircraft with a remote pilot. It was the first completely remotely piloted flight operation from DFRC in which takeoff, flight test, and landing were all accomplished with the pilot in a remote van. It also was the first instrumented flight of an oblique winged aircraft.

Pilot Jim Martin of Ames operated the vehicle using a television scene provided by a nose camera and transmitted to the remote pilot van. Martin used a side-kick controller, the television picture, plus instruments to complete the total flight.

Gary Layton of Dryden was the flight engineer and monitored the RPV telemetered instrument readings in the van beside Martin. The flight test lasted 24 minutes and was witnessed by a full control room of people including Dave Scott, the Director of Dryden Flight Research Center, as well as a contingent from Ames who made an early morning flight to DFRC to witness the 6:15 a.m. takeoff.

Jack Boyd, Deputy Director of Aeronautics and Flight Systems, headed the group that included Dick Petersen, R. T. Jones, Tom Gregory, Ron Smith, and Paul Harper from Ames Research Center.

Rod Bailey, the program manager from ARC, monitored the flight operations and test equipment from the control room with the assistance of Ron Smith. Jim Martin and Rod Bailey had been at DFRC for many weeks before the flight practicing the mission with flight simulators and a light aircraft with television cameras on board. Their diligence and skill paid off in a successful flight in which the wing of the unique airplane was rotated fifteen degrees so that flight test data could be obtained to compare with wind tunnel and simulation results.

The oblique winged remotely piloted aircraft weighs approximately 900 lb and has a 22-ft wing span. The vehicle is used to verify the aerodynamic characteristics of oblique winged aircraft and to compare and understand the dynamic characteristics of this concept which was invented by Dr. R. T. Jones of Ames. The concept has been under study at Ames for a number of years and the efforts have included system studies of civil transports as well as a variety of military aircraft. The efforts included wind tunnel studies of many vehicle configurations and the oblique winged RPV flight test program. Pres Nelms of Ames will present a comprehensive survey paper covering the technology program at the AIAA Aircraft System Technology Conference to be held at Dallas, September 24, 1976.

The technology program has demonstrated that the oblique winged concept has lower drag at high speeds than conventional swept wing or conventional variable sweep wing configurations. The program has systematically reduced the uncertainty regarding the aerodynamic performance, stability and control, and now the flight characteristics of such vehicles. In civilian applications, the vehicle concept promises supersonic transport capability without sonic boom and the flexibility to fly at high speeds with good economy and at lower speeds with excellent fuel efficiency. The wing concept has also been shown to be effective for cruise missile applications as well as other military functions.

The oblique winged RPV project was a unique team effort in which Flight Research Center took full responsibility for assuring a successful flight test program after ARC originated the concept, designed and built the vehicle under contract, and then wind tunnel tested and simulated the vehicles at Ames. Rod Bailey has had full responsibility for the program from its conceptual stage through the wind tunnel test, simulation and flight test. Bailey's responsibilities often extended to the white suit and wrench category when the vehicle was tested on the ground and in the 40- by 80-ft wind tunnel. During that period last winter the project caught the attention of many people including Ames Safety Officer Lew Hughes who dispatched a team to measure the noise level from the 4-cylinder, 90-horsepower McCulloch drone engine. Bailey and his test team of Paul Harper and Pete Putman (U.S. Army) had the privilege of working the swing shift after Dr. Hughes' tests indicated the noise levels didn't fit even the Ames Research Center environment.

After the vehicle was moved to Dryden Flight Research Center for further simulation and flight test planning, the DFRC team made significant changes in the onboard and ground equipment to assure the vehicle safety and make it compatible with the DFRC facilities. Dick Fisher and Gary Layton of DFRC headed the DFRC team that tackled the joint project with real enthusiasm. Jim Martin, the Ames pilot, and Einar Enevoldson, a DFRC pilot with experience in remote piloting the 3/8-scale F-15, conducted a number of practice flights with the twin Piper Comanche. This aircraft is equipped with a television camera and data link similar to the RPV and is flown with an onboard check pilot. Martin made over 30 take-offs and landings with this system before trying the oblique winged RPV with no check pilot on board.

Martin relates that remote piloting the unique RPV demanded his full attention and could be characterized as "intense." During the lift-off maneuver the vehicle rotated more than expected so that the horizon on the television screen went below the field of view. A few tense moments later it reappeared and the vehicle bounced on the runway before Martin got it on the nominal climb path. All the spectators in the Dryden control room viewed the same television scene that the pilot saw and shared some of the "intensity."

A few moments later Martin requested the pitch auto pilot be engaged and the television screen displayed a classical unstable condition as the horizon oscillated up and down with increasing magnitude. The pilot coolly took manual control and then requested another check of the auto pilot at higher speed. The same response was viewed and the decision was made to limit wing oblique positions to a maximum of 15°. After several test points were accomplished, Martin landed the vehicle very softly with the wing in the 0° position. The shadow of vehicle was in the picture as touchdown was approached, and gave the control-room crowd a clear indication that the vehicle landed safely. The Ames pilot did an excellent job during the flight and the DFRC crew did a thoroughly professional job.

The next flight is scheduled for September 16 and wing oblique positions up to 45° are planned.

Shuttle roll-out

Roll-out of the first Space Shuttle Orbiter will occur on Sept. 17, 1976, at the NASA/Rockwell International Space Division facility, Palmdale, Calif.

A ceremony to mark this milestone in the nation's future Space Transportation System will take place at 9:30 a.m. PDT. Media representatives are invited to attend.

Press facilities will be available on site for radio, television and print coverage.

What if? *(Continued from Page 1)*

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The program was coordinated through the Training and Special Programs Branch.

Pictured above are the students from the Upward Bound Program. Front row: George Varner, Khanh Nguyen, Gloria Solis, Rhonda Sanders, Millie Escarrega and Kinon Crawford. Back: Jon Miller, Jesse Valencia and Dan Davis.

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(Continued from Page 1)

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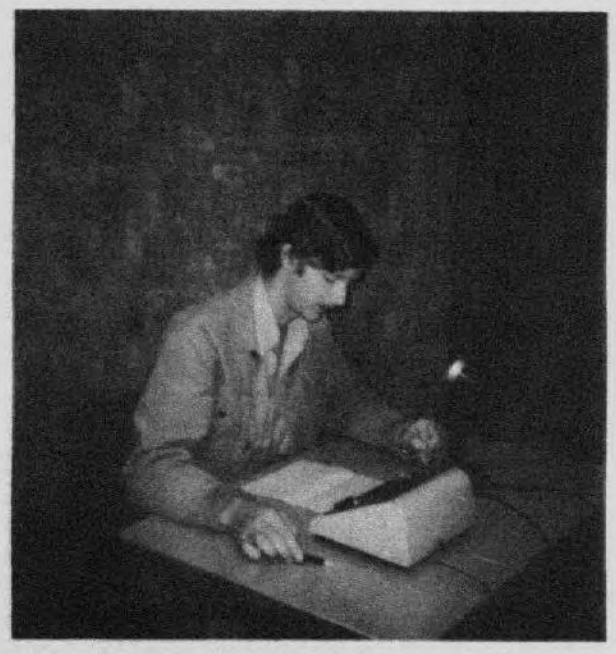
A hand-held transmitter that resembles a small police walkie-talkie, and an antenna that looks like an upside-down golf umbrella, are being used at the 3rd Century America exhibit at the Kennedy Space Center this summer, to talk to Ames Research Center. What makes the experiment interesting is that the conversation is being relayed from KSC to Ames via a NASA satellite. The satellite, called ATS-3, is currently in geostationary orbit 23,000 miles above South America. Therefore, the voice transmission from KSC is actually traveling well in excess of 46,000 miles before it reaches Ames.

The picture shows Mr. Chris Wright, a summer assistant in the Communications Branch Office, talking over the transmitter which Ames uses in the program. Mr. Wright is telling the audience at KSC the current status of the two Viking spacecraft, in a demonstration to show how voices can be relayed via satellite. Dr. Donald DeVincenzi (Assistant Chief of the Extraterrestrial Biology Division) and Mr. Sal Rositano (responsible for the Ames biomedical exhibit which is a part of the 3rd Century America) also have talked over the hook-up, as have personnel of the Communications Branch Office and the Educational Programs Office.

The hand-held transmitter was developed by General Electric and the transmissions are being monitored by GE in Schenectady. One activity of the demonstrations has been to arrange for conversations between a visitor at the transmitter site at KSC and their friends or families who are elsewhere, via the satellite. The procedure is to have the visitor talk over the satellite to GE Schenectady, who then arranges for a "phone patch" to transmit the conversation the remainder of the distance; the voice has already gone, of course, from KSC to the satellite and then to GE Schenectady. On some days, voice quality is not adequate – often because of weather conditions or interference by other users of different wavelengths on the satellite – but about half-a-dozen brief conversations have been completed.



The hand-held transmitter has been developed for possible use in the future for such users as hikers and campers. They will be able to report their location or announce that they are experiencing problems, and their announcements will be relayed via satellite to a monitoring station who can notify the appropriate source of help.

Petty theft continues

A stream of thefts involving small miscellaneous personal items, including cash, continues to be reported to the Security Branch. Recently, a locked credenza was unlocked and cash taken, because the key was left in an unlocked desk in the same office.

Everyone is again reminded to properly safeguard all personal property, such as handbags, wallets, cash, and credit cards. High-value metal, notably copper, is another item which has apparently sprouted legs and "walked."

Ames Promotion Plan vacancies

Notice No.	Title	Grade	Org.	Area of Consideration	Closing Date
76-146T	Secretary (typing)	GS-4/5	FOS	Centerwide	9-17-76
76-147T	Supvy High Altitude Aircraft Facility Manager	GS-14/15	SEH	NASA-wide and Outside	9-30-76
76-148T	Secretary (Typing or Stenography)	GS-4/5	D	Centerwide and Outside	9-22-76
76-149T	Lead Payroll Clerk	GS-6/7	AFP	Centerwide	9-17-76
76-150T	Secretary (Steno) or (Typing)	GS-4/5	AFB	Centerwide and Outside	9-17-76
76-151T	Procurement Clerk (Typing) or Clerk-Typist	GS-4/5 GS-3/4	AS	Centerwide and Outside	9-17-76
76-152T	Procurement Clerk (Typing) or Clerk-Typist	GS-4/5 GS-3/4	AS	Centerwide and Outside	9-17-76

TO APPLY: Call Extension 5599 or 5600

MERIT PROMOTION PLAN SELECTIONS

Notice No.	Title	Org.	Name
76-131T	Mathematician	RKS	Sara Rogallo
76-132T	Secretary (Typing or Stenography)	LMS	Cancelled/selection from CSD Register
76-134T	Procurement Clerk	ASE	Edith Lazzeroni
76-138T	Supvy Personnel Management Specialist	APM	Cancelled

Want ads

Transportation

'71 Ford LTD, 4-door, AC, excellent condition, $1500. Leaving country, available October 12. Phone 324-1788.

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'74 SUBARU Coup, 4-speed, floor shift, tachometer, AM radio, rear defogger, radial tires, 35 mpg highway, 25 city. Must sell, $2100/make offer. Phone 244-8380.

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'65 VW, European body (never sold in U.S.), rebuilt engine, must see to appreciate, $800/best offer. Phone 738-1259.

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'55 F100 P.U., 312 V-8, 3 Holly 2's, 10" Ansen, Mickey Thompson 50's, mesh chrome, $1800. Phone 262-0318.

FOR SALE: '71 FORD custom 500, 8 cyl., AC, AT, PS, high mileage but excellent condition. Best offer, phone 964-0462.

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'65 FORD FAIRLANE, 2-door, A/T, good engine, trans., brakes, & tires, 289 V-8, $400. Call Emmett Fry, 238-2168.

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FOR SALE: '70 Chevrolet Impala 4-door hardtop. NRC Post-doctoral Research Associate returning home, must sell. Gold color, auto., P/S, P/B, A/C, AM-radio, rebuilt transmission, new tires, very clean, excellent transportation, $800/best offer. Call Manfred Groll, 343-9927 after 6 p.m.

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'72 PANTERA, white with blue body stripes, many extras, only 29,000 miles, $10,750. Phone 249-4132 after 6 p.m. and weekends.

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'75 Toyota truck, SR5, bucket seats, new tires, HD bumper, $3250. Call Jack Addison, 493-7304.

Housing

Immaculate 4 bdrm., 2 bath, custom home with 2 patios in prime Cupertino location, near DeAnza college, $475. Phone 257-8106.

Miscellaneous

Antique mahogany bedside tables (pair) with 2 drawers each. Approximately 14"x20"x24". Sturdy and attractive. $25 each or $45 pair. Call 739-5373.

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Small Mahogany coffee table, about 36"x22"x18". Good condition, $20. Call 948-9399.

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WANTED to share ride from Santa Cruz to Ames. Contact Jesse at 965-6330.

PERSIAN rugs, sheep-skin jackets and Persian handicrafts. Must sell, leaving country, phone 964-0462.

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FOR SALE: Custom walnut desk, $40; DynaKit Stereo 70 (tuner, pre-amp and amp) $125; Garrard turntable, $25; Sears 10-gal. electric water heater, $25. Call 356-2913.

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WANTED - used upright piano. R. Curry, ext. 5249.

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Color TV - Zenith 25" table model, remote control, $100. Call 374-8142 (evenings).

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Bicycle, Girl's 20" Schwinn Stingray, good condition, large saddle-bag baskets and mini-T handlebars, $30. Violin, 1/2-size, German made, used 3 yrs., case and bow, good condition, $90. Call 739-9124.

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FOR SALE: Crib and mattress – $15; child's car seat – $5. Call 969-5586.

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SALE – New & Used Sport Equipment & Accessories: Water skis (Taper Flex, Cypress Garden, Cut-N-Jump); Snow skis (Fischer, Kneissl, Head, Hart, DuraFiber & Dynastar); Ski boots (Kastinger with new liners, Nordica, K2, & Henke); Motorcycle helmets (Bell, Grant, McHall, etc.); spark plugs for 2-cycle engines; older model new ski bindings. Call 494-7766 until 11 p.m.

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Interested in joining car pool from vicinity of Sharon Heights, Menlo Park, please call Ione, X5660.

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Drapes (pair) 54x115, custom made, brand new in beautiful white brocade, $65. Call 321-1858.

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Norelco (men's) shaver, needs a rocker switch, otherwise works great, $10/make offer. Call 321-1858.

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Bean bag chair, off-white, almost new, $12. Call 321-1858.

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FOR SALE: Ski boat, 14' fiberglass with 50 HP Johnson OB & trailer, $750/best offer. Call 948-5968.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

The Astrogram is an official publication of the Ames Research Center, National Aeronautics and Space Administration, Moffett Field, California, and is published bi-weekly in the interest of Ames employees.

Editor . . . . . Meredith Moore
Associate Editor . . . . Marcia Kadota
Reporters . . . . . NASA Employees

Deadline for contributions: Thursday between publication dates

NASA
National Aeronautics and Space Administration

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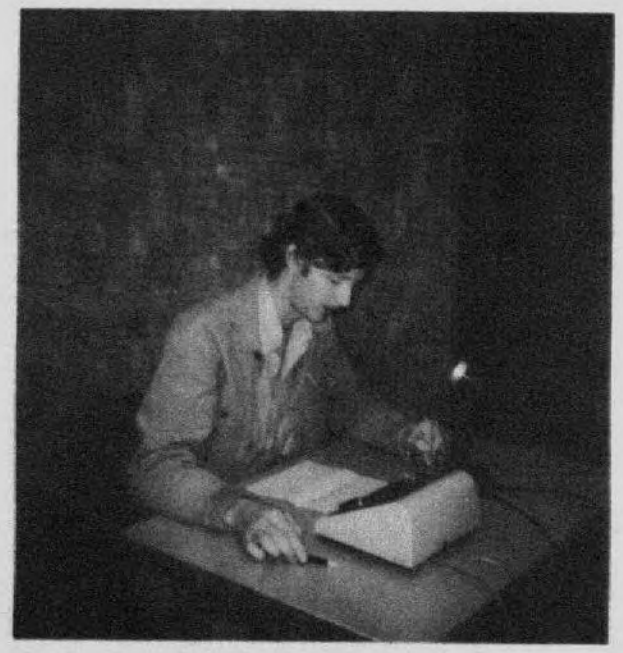
NASA satellite aids 3rd Century America exhibit

A hand-held transmitter that resembles a small police walkie-talkie, and an antenna that looks like an upside-down golf umbrella, are being used at the 3rd Century America exhibit at the Kennedy Space Center this summer, to talk to Ames Research Center. What makes the experiment interesting is that the conversation is being relayed from KSC to Ames via a NASA satellite. The satellite, called ATS-3, is currently in geostationary orbit 23,000 miles above South America. Therefore, the voice transmission from KSC is actually traveling well in excess of 46,000 miles before it reaches Ames.

The picture shows Mr. Chris Wright, a summer assistant in the Communications Branch Office, talking over the transmitter which Ames uses in the program. Mr. Wright is telling the audience at KSC the current status of the two Viking spacecraft, in a demonstration to show how voices can be relayed via satellite. Dr. Donald DeVincenzi (Assistant Chief of the Extraterrestrial Biology Division) and Mr. Sal Rositano (responsible for the Ames biomedical exhibit which is a part of the 3rd Century America) also have talked over the hook-up, as have personnel of the Communications Branch Office and the Educational Programs Office.

The hand-held transmitter was developed by General Electric and the transmissions are being monitored by GE in Schenectady. One activity of the demonstrations has been to arrange for conversations between a visitor at the transmitter site at KSC and their friends or families who are elsewhere, via the satellite. The procedure is to have the visitor talk over the satellite to GE Schenectady, who then arranges for a "phone patch" to transmit the conversation the remainder of the distance; the voice has already gone, of course, from KSC to the satellite and then to GE Schenectady. On some days, voice quality is not adequate – often because of weather conditions or interference by other users of different wavelengths on the satellite – but about half-a-dozen brief conversations have been completed.



The hand-held transmitter has been developed for possible use in the future for such users as hikers and campers. They will be able to report their location or announce that they are experiencing problems, and their announcements will be relayed via satellite to a monitoring station who can notify the appropriate source of help.

Petty theft continues

A stream of thefts involving small miscellaneous personal items, including cash, continues to be reported to the Security Branch. Recently, a locked credenza was unlocked and cash taken, because the key was left in an unlocked desk in the same office.

Everyone is again reminded to properly safeguard all personal property, such as handbags, wallets, cash, and credit cards. High-value metal, notably copper, is another item which has apparently sprouted legs and "walked."

Ames Promotion Plan vacancies

Notice No.	Title	Grade	Org.	Area of Consideration	Closing Date
76-146T	Secretary (typing)	GS-4/5	FOS	Centerwide	9-17-76
76-147T	Supvy High Altitude Aircraft Facility Manager	GS-14/15	SEH	NASA-wide and Outside	9-30-76
76-148T	Secretary (Typing or Stenography)	GS-4/5	D	Centerwide and Outside	9-22-76
76-149T	Lead Payroll Clerk	GS-6/7	AFP	Centerwide	9-17-76
76-150T	Secretary (Steno) or (Typing)	GS-4/5	AFB	Centerwide and Outside	9-17-76
76-151T	Procurement Clerk (Typing) or Clerk-Typist	GS-4/5 GS-3/4	ASE	Centerwide and Outside	9-17-76
76-152T	Procurement Clerk (Typing) or Clerk-Typist	GS-4/5 GS-3/4	AS	Centerwide and Outside	9-17-76

TO APPLY: Call Extension 5599 or 5600

MERIT PROMOTION PLAN SELECTIONS

Notice No.	Title	Org.	Name
76-131T	Mathematician	RKS	Sara Rogallo
76-132T	Secretary (Typing or Stenography)	LMS	Cancelled/selection from CSD Register
76-134T	Procurement Clerk	ASE	Edith Lazzeroni
76-138T	Supvy Personnel Management Specialist	APM	Cancelled

Want ads

Transportation

'71 Ford LTD, 4-door, AC, excellent condition, $1500. Leaving country, available October 12. Phone 324-1788.

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'74 SUBARU Coup, 4-speed, floor shift, tachometer, AM radio, rear defogger, radial tires, 35 mpg highway, 25 city. Must sell, $2100/make offer. Phone 244-8380.

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'65 VW, European body (never sold in U.S.), rebuilt engine, must see to appreciate, $800/best offer. Phone 738-1259.

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'55 F100 P.U., 312 V-8, 3 Holly 2's, 10" Ansen, Mickey Thompson 50's, mesh chrome, $1800. Phone 262-0318.

FOR SALE: '71 FORD custom 500, 8 cyl., AC, AT, PS, high mileage but excellent condition. Best offer, phone 964-0462.

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'65 FORD FAIRLANE, 2-door, A/T, good engine, trans., brakes, & tires, 289 V-8, $400. Call Emmett Fry, 238-2168.

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FOR SALE: '70 Chevrolet Impala 4-door hardtop. NRC Post-doctoral Research Associate returning home, must sell. Gold color, auto., P/S, P/B, A/C, AM-radio, rebuilt transmission, new tires, very clean, excellent transportation, $800/best offer. Call Manfred Groll, 343-9927 after 6 p.m.

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'72 PANTERA, white with blue body stripes, many extras, only 29,000 miles, $10,750. Phone 249-4132 after 6 p.m. and weekends.

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'75 Toyota truck, SR5, bucket seats, new tires, HD bumper, $3250. Call Jack Addison, 493-7304.

Housing

Immaculate 4 bdrm., 2 bath, custom home with 2 patios in prime Cupertino location, near DeAnza college, $475. Phone 257-8106.

Miscellaneous

Antique mahogany bedside tables (pair) with 2 drawers each. Approximately 14"x20"x24". Sturdy and attractive. $25 each or $45 pair. Call 739-5373.

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Small Mahogany coffee table, about 36"x22"x18". Good condition, $20. Call 948-9399.

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WANTED to share ride from Santa Cruz to Ames. Contact Jesse at 965-6330.

PERSIAN rugs, sheep-skin jackets and Persian handicrafts. Must sell, leaving country, phone 964-0462.

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FOR SALE: Custom walnut desk, $40; DynaKit Stereo 70 (tuner, pre-amp and amp) $125; Garrard turntable, $25; Sears 10-gal. electric water heater, $25. Call 356-2913.

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WANTED - used upright piano. R. Curry, ext. 5249.

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Color TV - Zenith 25" table model, remote control, $100. Call 374-8142 (evenings).

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Bicycle, Girl's 20" Schwinn Stingray, good condition, large saddle-bag baskets and mini-T handlebars, $30. Violin, 1/2-size, German made, used 3 yrs., case and bow, good condition, $90. Call 739-9124.

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FOR SALE: Crib and mattress – $15; child's car seat – $5. Call 969-5586.

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SALE – New & Used Sport Equipment & Accessories: Water skis (Taper Flex, Cypress Garden, Cut-N-Jump); Snow skis (Fischer, Kneissl, Head, Hart, DuraFiber & Dynastar); Ski boots (Kastinger with new liners, Nordica, K2, & Henke); Motorcycle helmets (Bell, Grant, McHall, etc.); spark plugs for 2-cycle engines; older model new ski bindings. Call 494-7766 until 11 p.m.

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Interested in joining car pool from vicinity of Sharon Heights, Menlo Park, please call Ione, X5660.

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Drapes (pair) 54x115, custom made, brand new in beautiful white brocade, $65. Call 321-1858.

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Norelco (men's) shaver, needs a rocker switch, otherwise works great, $10/make offer. Call 321-1858.

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Bean bag chair, off-white, almost new, $12. Call 321-1858.

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FOR SALE: Ski boat, 14' fiberglass with 50 HP Johnson OB & trailer, $750/best offer. Call 948-5968.

The Astrogram

Room 142, Admin. Mgt. Building, Phone 965-5422

The Astrogram is an official publication of the Ames Research Center, National Aeronautics and Space Administration, Moffett Field, California, and is published bi-weekly in the interest of Ames employees.

Editor . . . . . Meredith Moore
Associate Editor . . . . Marcia Kadota
Reporters . . . . . NASA Employees

Deadline for contributions: Thursday between publication dates

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