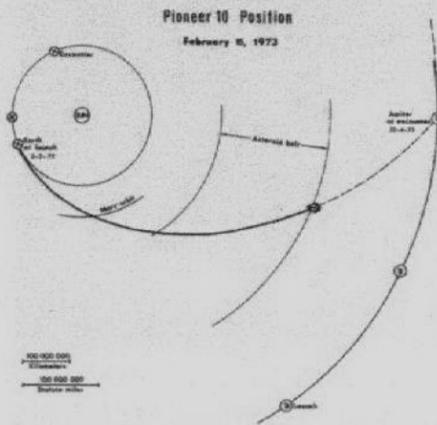




National Aeronautics and Space Administration • Ames Research Center, Moffett Field, California



Joint US-USSR mission told

By Irina Lunacharskaya,
Scientific Commentator
USSR Novosti Press Agency

In 1968 the United Nations adopted a resolution on rescue and return of spacemen in case of emergency. But to render aid to a space ship, the vehicles should be provided with what is called compatible means of approach and docking. Without it joint space exploration is impossible.

Prof. Konstantin Bushuyev, corresponding member of the USSR Academy of Sciences and Soviet project director, and Dr. Glynn Lunney, American project director, talked with journalists about the

chief tasks facing the designers, and above all, the androgynous peripheral docking system to be installed on both spacecraft for the Soviet-American flight scheduled for 1975.

The purpose is to develop a docking bay whose central part would serve as a tunnel for a passage of crews from one spacecraft into another. It should be, at the same time, a chamber where the crew members could adapt themselves to the different atmospheres of each other's craft (pure oxygen in Apollo and a nitrogen-oxygen mixture in Soyuz). The pressure in the docked spaceships will be e-

PIONEER 10 POSITION . . .
On Feb. 15 Pioneer 10 was 340 million miles from Earth, 421 million miles from the Sun, and moving toward Jupiter at 33,700 mph.

Pioneer 10 emerges from Asteroid Belt

Pioneer 10, on its way to Jupiter for man's first close look at the giant planet, has emerged unscathed from the Asteroid Belt.

The spacecraft has completed a 270-million-mile, seven-month trip through the belt without suffering a damaging hit by high velocity particles. Scientists now believe the belt offers relatively little hazard to spacecraft.

Reports of preliminary findings by Pioneer 10 experimenters at a news conference in Washington, D.C. suggested that the belt may contain somewhat less material than previously thought - especially in the small particle sizes.

Pioneer 10 entered the region occupied by most of the asteroids in mid-July when it was about 190 million miles from the Sun. It is now at the outer edge of the belt, (Continued on Page 2)



PRIME CREWMEN . . . selected for the joint United States-Soviet Union Earth orbital space flight, Apollo-Soyuz Test Project, are (l to r) Donald K. Slayton, docking module pilot, Vance D. Branc, command module pilot, and Thomas P. Stafford, commander.

NASA helps minority colleges

NASA is undertaking to expand its program of sponsored research at four-year colleges and universities having predominantly minority enrollments. About 100 institutions have been invited to consider whether and how they might choose to participate.

Most of NASA's sponsored research has been conducted at uni-

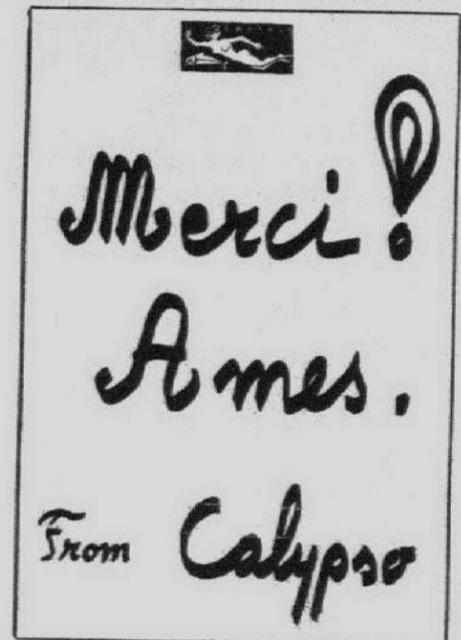
versity graduate schools. This practice tended to bar participation by institutions with largely minority enrollments because they lacked graduate departments.

In 1969, NASA began to involve these minority schools in aeronautical and space research projects, and since that time 25 schools have (Continued on Page 3)

qualified. The docking targets, orientation lights and other elements and systems will help in the rendezvous, docking and joint flight of the two spaceships.

The leaders of the projects have said that operating models of the docking systems, 2.5 times smaller than the real ones, have already been designed and produced.

The models will be linked and tested during the next meeting after extensive laboratory work on both sides.



"Thank You! Ames. From Calypso," was the message received from Jacques Cousteau's research ship safe in the South American port of Ushuaia.

Ames helps Calypso cross stormy sea

After five days of rough seas in Drake's passage, Jacques Cousteau's research ship, Calypso, radioed a sincere "Thank You" to Ames Research Center.

With weather information from Ames, the ship crossed the notoriously stormy area of ocean between the tip of South America and the Antarctic with one-third her normal power. A collision with an iceberg had torn a six-foot hole in her wooden hull, destroying the port propeller shaft and damaging the starboard propeller.

The ship hit ice off Antarctica on Jan. 16. With a top speed of five to six knots the ship put in at King George Island for temporary repairs. Cousteau decided to take her to the South American port of Ushuaia, 500 miles away, for complete repair.

NASA, the Navy and the National Oceanic and Atmospheric Administration (NOAA) teamed up to keep communications with the ship, sending weather information periodically. Ames stayed in contact with Calypso as it has during the past several months, via NIMBUS and NOAA satellites by means of a Goddard-furnished Automatic Picture Transmission (APT) receiver.

Pioneer 10 Emerges from Asteroid Belt

(Continued from Page 1)

340 million miles from the Sun. The spacecraft has covered about 70 per cent of its 620-million-mile flight to Jupiter. It will arrive at the planet next December.

One of the key objectives of the Pioneer 10 mission is to determine the amount of the smaller dust particles in the Asteroid Belt. These, of course, cannot be seen from Earth.

Preliminary findings suggest that the distribution of particles between Earth's orbit and the far side of the Asteroid Belt seems to depend on size. There may actually be more of the very smallest particles (1/1000 mm diameter) near Earth than in the belt. Somewhat larger particles (1/100 to 1/10 mm diameter) appear to be evenly distributed all the way from Earth's orbit through the far side of the Asteroid Belt with no increase in the belt.

Still larger particles (1/10 to 1 mm diameter) were found all the way out but were almost three times as frequent in the belt as outside it. Particles larger than 1 mm diameter appear to be very thinly spread - as many scientists expected.

Preliminary analyses of Pioneer 10 asteroid telescope observations have not identified any particles larger than 1 mm (.04 inches), though further analysis may change this.

Pioneer 10 did not pass near any of the very large asteroids that can be seen from Earth by telescopes.

One explanation, among several, for slight distribution of small particles in the belt is that solar radiation may reduce orbital speed of such particles. Then solar gravity would cause them to spiral in toward the Sun. Larger particles would be less affected and could maintain their orbits.

Pioneer experimenters also reported that as far out as 350 million miles from the Sun solar magnetic field strength, solar wind density and numbers of solar high energy particles all decline roughly as the square of the distance from the Sun.

Among solar high energy particles, experimenters have found the elements sodium and aluminum for the first time.

Researchers found that the neutral hydrogen of the "interstellar wind" appears to enter the heliosphere (the Sun's atmosphere) in the plane of Earth's orbit. This is about 60 degrees away from the direction of travel of the solar system through space.



ROBERT W. MAC CORMACK



ROBERT C. INNIS



CURT A. HOLZHAUSER



HERVEY C. QUIGLEY

Two papers receive 1973 H. Julian Allen Award

Ames research scientists Robert W. MacCormack, STT; Robert C. Innis, FSO; Curt A. Holzhauser, FPV; and Hervey C. Quigley, FPS; were selected as the 1973 H. Julian Allen Award recipients recently.

Each year the award is presented with an honorarium of \$1000 for the scientific or engineering paper judged best by the Award Committee.

This year two papers were chosen. MacCormack's "Numerical Solution of the Interaction of a Shock Wave with a Laminar Boundary Layer" was recognized as the best scientific paper.

Innis, Holzhauser and Quigley's "Airworthiness Considerations for STOL Aircraft" was picked as the most outstanding engineering paper.

Established in 1969, the award is named in honor of the former Ames Director and originator of the "blunt nosed" concept for re-entry vehicles, H. Julian Allen.

Presentation of the awards and honorariums will take place during a ceremony to be scheduled at the end of March. The winning papers will be presented by their writers at that time.

OAO-2 shuts down after four successful years

NASA's Orbiting Astronomical Observatory-2 (OAO-2) was shut down at 10:40 p.m. (EST) Feb. 13, during its 22,000th orbit of Earth, ending one of the most productive careers in the history of space satellites.

Designed to operate for one year, OAO-2 far exceeded the fondest hopes of project officials by operating more than four years. During its long lifetime the observatory made pioneering contributions to the

space age scientific field of ultraviolet astronomy.

The shutdown followed failure of the high voltage system of the University of Wisconsin experiment on board the spacecraft, so that it was unable to continue to acquire useful scientific data. Attempts to reactivate the experiment by ground command from the OAO Control Center at the Goddard Space Flight Center were unsuccessful.

Launched on Dec. 7, 1968, from

Kennedy Space Center, Fla., the 4,400 pound observatory carried two scientific experiments provided by the University of Wisconsin and the Smithsonian Astrophysical Observatory.

BLOODMOBILE

MARCH 9

9 A.M. - 12 P.M.

AMES AUDITORIUM

Internal Environment Assessment

In the next week or two, a randomly selected group of employees will be asked to respond to a NASA-wide survey and a smaller group to participate in subsequent group discussions. The purpose of this effort is to assess the NASA internal environment. Those selected will receive a short questionnaire asking for anonymous comments on several factors in the current work environment and on their level of interest for each factor.

After the questionnaire has been completed, a small number of em-

ployees will be asked to discuss, in two groups, the more important factors identified in the questionnaire. One group of younger employees will meet with Cynthia Smith, and a more senior group will meet with C.A. Syvertson.

The results of the survey will be reviewed by the Personnel Management Review Committee (PMRC) of which C.A. Syvertson is a member, and the findings will be fed back to the Center. The PMRC is composed of senior management officials from several NASA centers and Headquarters who are responsible for providing the Administrator with policy guidance and feedback on significant personnel management issues.

The SYE was established by the PMRC to advise them primarily in the area of utilization and development of young professionals. Any questions about the survey or the PMRC and SYE should be directed to the representatives mentioned above.

More detailed information on the PMRC and its subcommittee is contained in NMI 1152.26 and 1152.37 respectively.

Minority Colleges

(Continued from Page 1) participated.

NASA is now seeking to at least double the number of participating minority institutions, and to expend about 5 per cent of the total basic and applied university research funds with such schools. This target would correspond to the roughly 5 per cent proportion of minority colleges in the over all higher education community.

The expanded program was developed in cooperation with the National Association for Equal Opportunity in Higher Education.



FAX and FAO celebrate 10th anniversary

... by Stuart Treon

A 10th anniversary celebration was held recently by the Experimental Investigations Branch and the Mechanical Operations Branch of the Aeronautics Division. Officially created in late 1962, the branches were essentially in full-blown operation in July 1963.

Since that time the two branches have jointly accomplished over 600 test entries in the Unitary Plan, 12-foot, 6- by-6 foot, 14-foot, 2- by-2 foot and 1- by -3 foot wind tunnels for an aggregate of over 88,000 occupancy hours.

In addition, under the jurisdiction of the Experimental Investigations Branch, ARO Inc., currently contract operator of the 12-foot, 14-foot and 6- by 6-foot wind tunnels, has completed 271 tests entailing more than 45,000 facility occupancy hours.

Staff members and "alumni" acknowledged the occasion in the Unitary Plan 9- by -7 foot wind tunnel test area with cake, candles and a heart felt rendition of "Happy Birthday to Us."

Three Dewars Lost

LOST

The illustration at left shows a liquid nitrogen Dewar, owned by Almac Cryogenics, Inc. It is grey with a black neck and weighs between 200 and 500 pounds.

Three Dewars have been lost or stolen from Ames recently. The Supply Branch would like them returned. Their serial numbers are 3782, 4166 and 7080.

Anyone knowing their whereabouts is asked to call ext. 5206, Supply Branch; ext. 5206, Walter Schalles; or Dick Tate, ext. 5674.



How to appraise files in 60 seconds

(Editor's note: The following is the conclusion of a three-part series on filing, begun two issues ago in The Astrogram).

Step 4. Notice how the file folders are labeled. Are regular file folder labels used? Are the labels typed? Or are they hand-written? Are the labels crossed out and typed or written over?

Handwritten folder labels indicate one of two things: (1) the file supervisor doesn't realize that even the best handwriting may not be legible to another person and should not be tolerated in a filing operation in which instant eye identification of a folder is so important to fast, efficient operation. (2) The clerks feel they have too much to do and do not have the time to properly type a folder label, forgetting that if the folders were properly typed, look-up and filing

time would be decreased, providing more time for the details which make for faster filing.

Many companies are not aware that you can get folder labels from the computer. Thousands can be printed in a few hours, eliminating hundreds of hours of typing time in the file room.

Step 5. Notice the amount of material filed in individual file folders.

Filing supply manufacturers "score" or pre-press fold lines at the bottom of the front flap of a file folder to enable the user to house records neatly. Folders are normally scored to hold 3/4 of an inch of material. When more material is placed in the folder, it will "ride-up," hide the ripping, tearing and other mutilation. When labels are hidden, filing speed slows to a walk.

Top attendance at Credit Union meeting

The Moffett Field Employee's Credit Union's annual business meeting was attended by 270 members celebrating its phenomenal growth during 1972.

During a short business meeting President John Pogue announced a membership increase of 15% and a 20%, or nearly \$1 million increase, in credit union assets. Manager Fred Mayer reported growth of over 23 times in the past five years.

Building Committee Chairman Edward P. Seward announced plans for a new building to house the credit union's recent and projected growth. And, the election of Directors; Ron Denison, Ramsey Melugin, and Jack Davidson, and Supervisory Committee Members Frank Atcheson and Ernest Iufor was reported.

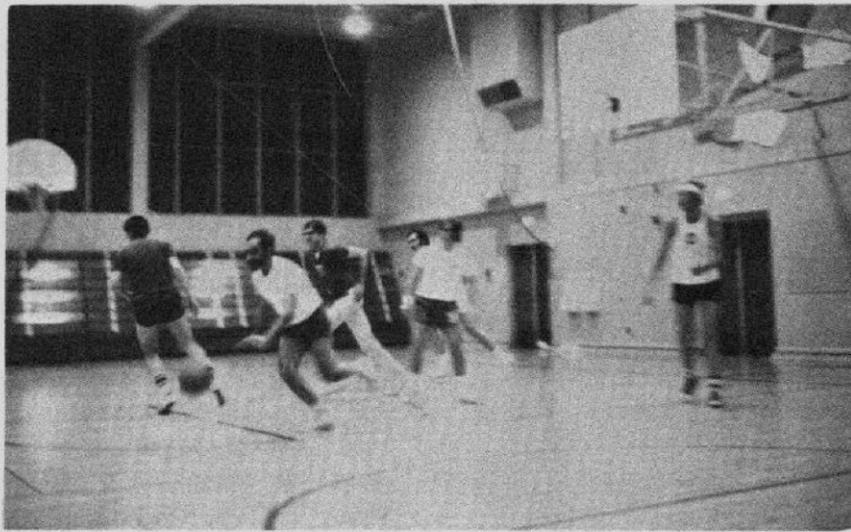
A prize drawing and dance to celebrate the windfall year of 1972

followed the meeting. Grand prize winners were; Paulette Johnson who won a week's use of an Open Road motor home; Jackie Moore who won a weekend for two at Tahoe; and Merle Flowers who won a weekend for two at Reno.

Mayer said this year's business meeting was the best-attended in the history of the Union. He feels this record attendance is due to the phenomenal growth of the credit union and the increased member interest in activities.

The credit union offers savings, credit, and financial counseling services to retired and active military and federal employees throughout the Bay Area.

For information contact Fred Mayer, Moffett Field Employee's Credit Union, NAS Moffett Field, CA; (415) 966-5494.



CHARLES CHACKERIAN of Space Science takes the ball, but not for long. In the final game of the season the Beer Barrels finished out an undefeated record with a win over Space Science. Players pictured are (1 to r) Mlado Chargin, Beer Barrels; Chackerian; Frank Steinle, Beer Barrels; Peter Silvagio, Beer Barrels; David C. Black, Space Science; and John Arveson, Space Science.

Basketball

FINAL STANDINGS

Team	WON	LOST
Beer Barrels	8	0
Fighting Pumas	7	1
Jets	6	2
Spoilers	5	3
MAD	4	4
ARO	3	5
CSC	2	6
Space Science	1	7
MFB	0	8

The All Ames Basketball League completed play for the 1972-73 season. The Beer Barrels, after many previous second place finishes, finally won the championship with a perfect 8-0 record.

Ames' Sportsman

If Ames were to elect a sportsman of the year it would probably be Bruce C. Ganzler, FLE. He organized the Ames Basketball League five years ago and has managed it since. As a member of the Jogger-nauts, he recently suggested the 500-Mile Club which honors members for miles run, at 500-mile integrals. The club doubled the Jogger-nauts' membership.

At noon each day he plays volleyball. During the summers he plays softball with an Ames team he has managed for the past two years. And, a few years ago he organized a bowling team, the Keggers, which won the Ames championship for the two years it was in existence.

When asked why he is so involved in sports he says, "I came from a very sports-minded neighborhood in Schenectady, New York." There he played sand lot baseball, soccer, and all the ordinary street sports.

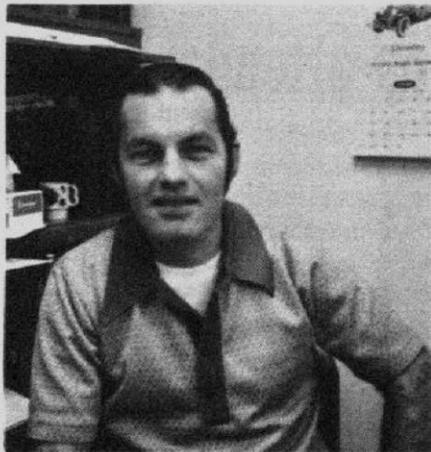
When he was 13 he organized his

Sierra Club Show

The Loma Prieta Chapter of the National Sierra Club is presenting a lecture and slide presentation entitled "Images and the Natural World," Wednesday, March 14.

Featuring photographs by Lou Smaus, well-known Bay Area photographer, the presentation will begin at 7:30 p.m. at Gunn High School, 780 Arastradero Blvd., Palo Alto, in Spangenberg Auditorium.

The program is designed to; "bring added meaning to ecology as nature speaks for herself in form, texture and color." Smaus will also present a "mini-tour" of the Alaskan scene.



BRUCE GANZLER

first team. They played baseball in New York's Kwanis League. "We almost made champs," he recalls.

"It's just one of those things," he says of his knack for organization. "You play for fun, but the only way you'll get a team going is to organize it yourself."

Before coming to Ames he played softball for the Air Force and semi-professional soccer with New York State's Central League.

WANT ADS

AUTOMOBILES

The secret to good communication is conciseness. Please limit want ads to 15 words.

FOR SALE

67 Pont. Catalina, PB, PS, A/C, AT, 2-dr., HT, make offer, call 225-3061 after 5.

68 4-dr. Galaxie 500, auto, air cond. PB, PS, radio, \$1000, 244-7415.

66 Impala 4-dr., H.T., A, PS, RH, low mileage, 377-0983.

65 Buick sp. auto, R/H, defogger, new tires, tune up, tags, ex. cond. \$450. Call Mike 965-6142/948-9559.

64 XKE Jaquar, wire sheels, radial tires, 4-spd., gd. cond., \$1500/offer H. Nelson, 941-5206.

HOUSING

He who submits a want ad with more than 15 words gets it altered free.

FOR SALE

4-br, 2 1/2 ba., 2100 sq. ft., near Mt. Pleasant Golf Course, \$37,000 238-0129.

MISCELLANEOUS

FOR SALE

Houseful of furniture, must see to appreciate, call 265-8092.

Happenings

SPEAKERS

Paul Harvey, California Institute of Technology

"Variability of Infrared-OH Microwave Stars"
March 6, 10:30 a.m., building 245, auditorium.

Professor John Oro, University of Houston

"From Interstellar Molecules to Biological Compounds"
Thursday, March 1, 3 p.m., building 239, B-39.

SYMPOSIUMS

Earth Resources Symposium, March 5-9, Sheraton Inn, New Carrollton, Maryland.

Fourth Annual Lunar Science Conference, March 5-8, Manned Spacecraft Center, Houston.

Bloodmobile, March 9, 9 a.m. to 12 p.m., Ames auditorium.

Dog Barrier for station wagon, all chrome, adjustable \$20, 738-3689.

Tire chains, will fit some 13,14,15 or 16" dia. wheels, \$5, 321-0625 after 5.

2 king size bed spreads, floral print ex. cond. \$10 ea. 321-0625 after 5.

Garard Zero 100 changer w/ walnut base, Shure V-15 type II "Super Track" cartridge, new cond. \$150 738-2948.

Want ads, like bathing suits, should be brief. (15 words or less).

Formica table top w/ legs (60 x 40) good second dining or study table, gd. cond., \$28, 321-1858.

Luggage, Invicta 30" suitcase, ex. cond. \$27 (cost \$50 new). Handbag like new, \$10. 321-1858.

Sony 660 tape recrd, 100 watt amp. 4 spkr, auto. revrse, \$500 new, \$225 349-5929.

Collection of over 5000 stamps mounted in 2-vol. album. \$125, Mort 968-7341.

Girl's 26" bike, 1 bad tire, otherwise gd. cond. \$20. 964-2918.

Ring, perfect 38-point round diamond, papers, \$300/offer. 964-2918.

72 Brunswick 4' x 8' pool table, 5" thick honeycomb bed. Auto. return. \$275 or best offer, 408-266-4513.

TV Schedules Available

TV schedules for Spring Quarter ACE and Stanford courses are available in the Training Office, Room 138, Building 241, ext. 5623.

GOLF

As a result of a recent change in the Ames Golf Club Constitution, membership in the Club has been extended to the immediate families of regular members as well as those of retired Ames employees. In a second change, the Ames Golf Champions will be the person who has the lowest scratch average in 6 of the regularly scheduled Ames Golf Tournaments. Clark White has agreed to extend the current membership drive until December 1973. However, he would appreciate receiving your dues soon.

. . . by Jack Lee

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

Shuttle will make space accessible to non-astronauts



By the end of this decade, the monopoly that astronauts now have on space flights will come to an end. The Space Shuttle will make it possible for scientists and engineers, men or women, to take their equipment into orbit, conduct experiments, and return to Earth with the collected data.

To do this, NASA envisions a simple pressurized laboratory module carried in the Space Shuttle

cargo bay. Called the space lab, it would allow space experimenters to directly participate in missions ranging from seven to 30 days.

The space lab concept is based on NASA's continuing Airborne Research Program. This program, conducted aboard Ames' Convair 990 transport and a Lear jet allows scientists to conduct Earth and celestial observations from airplanes with a minimum of cost and

red tape. In some cases, the experimenters have their own instruments installed aboard the airplane and in other cases they use existing instruments to make observations of particular interest to them.

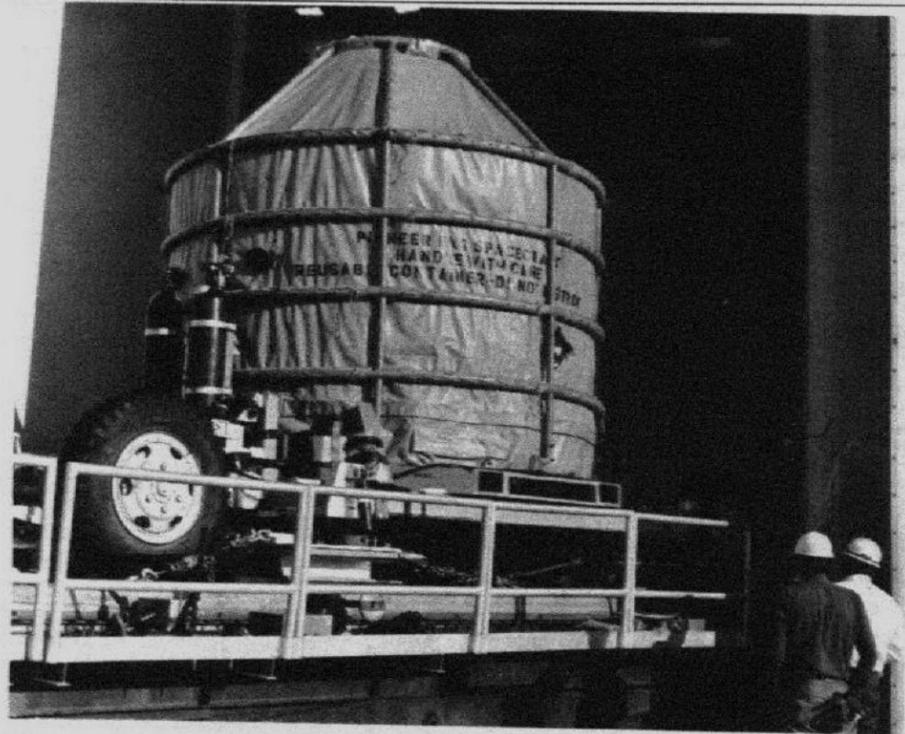
Space lab operations will be much like this. A single set of experimental equipment, meeting adequate but not extreme safety and reliability standards, would be developed in the experimenter's laboratory, installed in the space lab or on a unpressurized pallet attached to the lab, and flown within a short period of time.

Two modes of operation are conceived. In one mode, the space lab would be outfitted as a general laboratory with the equipment needed to support a broad range of disciplines. The onboard experiments would be changed extensively between flights. In the other mode,

larger, more complex instruments such as telescopes or material processing equipment might be permanently installed in a laboratory module or on a pallet and would be used repeatedly with little or no modification.

The basic space lab will be a cylinder approximately 26 feet long and 14 feet in diameter. It will have a total volume of approximately 4,000 cubic feet. A 14.7 pounds per square inch atmosphere of oxygen and nitrogen will provide a shirtsleeve environment and will minimize the fire proofing requirements formerly imposed by the pure oxygen atmosphere of earlier spacecraft.

The lab will be equipped with racks to hold electronic equipment for the experiments. Work facilities similar to Earth workbenches but (Continued on Page 2)



Pioneer G delivered for April launch

As Ames' Pioneer 10 spacecraft nears completion of its journey to Jupiter, Pioneer G (Pioneer 11 after successful launch) is delivered to Cape Kennedy Air Force Station in Florida for initial prelaunch check-out.

The 570 pound spacecraft will, like Pioneer 10, fly through the Asteroid Belt and pass close to Jupiter, investigating both heretofore unexplored areas of space.

Pioneer G differs in two aspects

from Pioneer 10; it may, instead of escaping the solar system, go into solar orbit, and, it will carry a Flux Gate Magnetometer to measure very high magnetic fields on Jupiter.

During the mission, which could last seven years, 14 experiments will be conducted via the spacecraft. It will be launched some time in April from Cape Kennedy. It will reach Jupiter sometime in February, 1975.

Elevator operator to aircraft pioneer

Robert T. (R.T.) Jones has become something of a celebrity at Ames in the past few weeks. Since his slant-wing design for supersonic aircraft was revealed to the public, interest in his career has been piqued. And, it is an uncommon career.

It began in the second decade of this century, before Dr. Jones had graduated from high school. Like most boys in Macon, Missouri at the time, R.T. liked circuses. But the future originator of the swept-wing concept, the concept on which most modern aircraft are based, was especially fond of a flying circus owned by his friend, Charles Fower.

The circus' main attraction was a biplane in which R.T. received his first flying lessons. In return for "stick time" he patched wings and carried gas.

College interrupted this education in 1928. After high school graduation R.T. left Macon for Columbia, Missouri to attend the state university there. But, after one year of studying mechanical engineering he was bored and went back home to the flying circus.

That was in the early summer. Winter had been hard on the biplane. Long cold months in a pasture had rotted the fabric of the wings. Cows had eaten the tail. So Charles Fower decided to take it to the Nicholas Beasley Airplane Company in Marshall, Missouri for repairs. To buy a ride to the Beasley Company R.T. made the biplane airworthy.

(Continued on Page 2)



23 Tech Brief Awards

Tech Brief awards are presented to NASA scientists and engineers who have developed new technology that could be utilized by and valuable to the public.

Tech Briefs, themselves, are public announcements of new technology derived from the U.S. space program.

Last month 23 Ames scientists and engineers received awards for work announced in the form of 14 Tech Briefs. Dale L. Compton, Technical Assistant to the Director, made the presentations at a small ceremony in the Director's Conference Room.

The award-winning employees and their papers are (l to r, front row in the photo above):

John W. Hawkins, STP, Micro-Regulating Ball Valve; Dean R. Harrison, RFD, Heart Catheter Cable and Connector; Richard R. Adachi, LRP, Programmed Physiological Infusion System; Donald R. Young, LRP, Programmed Physiological Infusion System; Richard F. Haines, LTN, Visual Sensitivity Tester; Angelo P. Margozzi, SS, A Dual-Beam Actinic Light Source for Photosynthesis Research; William J. Borucki, SST, Lightning Flash Detection System; (second row) Frank L. Cota, RSM, Heart Catheter Cable and Connector; Wayne H. Howard, LRP, Programmed Physiological Infusion System; Charles T. Jackson, FSR, Overlay Board for Computer Consoles; Thomas B. Fryer, RFD, An Ingestible Temperature-Transmitter; Clifford N. Burrous, FSV, Temperature Compensation of Emitting Diodes; James W. Fitzgerald, retired, Cine Recording Ophthalmoscope and Visual Sensitivity Tester; (third row) Don-

ald Billings, FSV, Lightning Flash Detection System; Wayne O. Hadland, RFE, Adjustable Support Spring; Leroy R. Guist, FAX, Simple Method for Forming Thin Walled Pressure Vessels and Bileaf Mechanical Strain Gage; Joseph R. Smith, Jr., FLE, Ear Oximeter-Transducer Monitors Four Physiological Responses; Dale Compton.

Those not pictured and their Tech Briefs are: Albert L. Erickson, retired, Simple Method for Forming Walled Pressure Vessels; Harold Sandler, LR, Heart Catheter Cable and Connector; Salvadore A. Rositano, RFS, Visual Sensitivity Tester; Gordon J. Deboo, RFD, Temperature Compensation of Emitting Diodes; Milton E. Henderson, RSM, A Dual-Beam Actinic Light Source for Photosynthesis Research; Jack M. Pope, FSV, An Ingestible Temperature-Transmitter; Harold Sandler, LR, An Ingestible Temperature-Transmitter.

Third Annual Space Day at Ames

Ames hosted 300 college, high school, and elementary school students March 2 to the Third Annual Aeronautics and Space Day. Beginning with a talk by Alfred M. Worden, Apollo 15 Command Module Pilot, the students spent the day listening to 16 experts describe Ames' latest research programs.

Sponsored by NASA and the California Aerospace Education Association, the annual event was coordinated here by Mike Donahoe, Ames Educational Programs Officer.

The students were picked by their science teachers to participate.

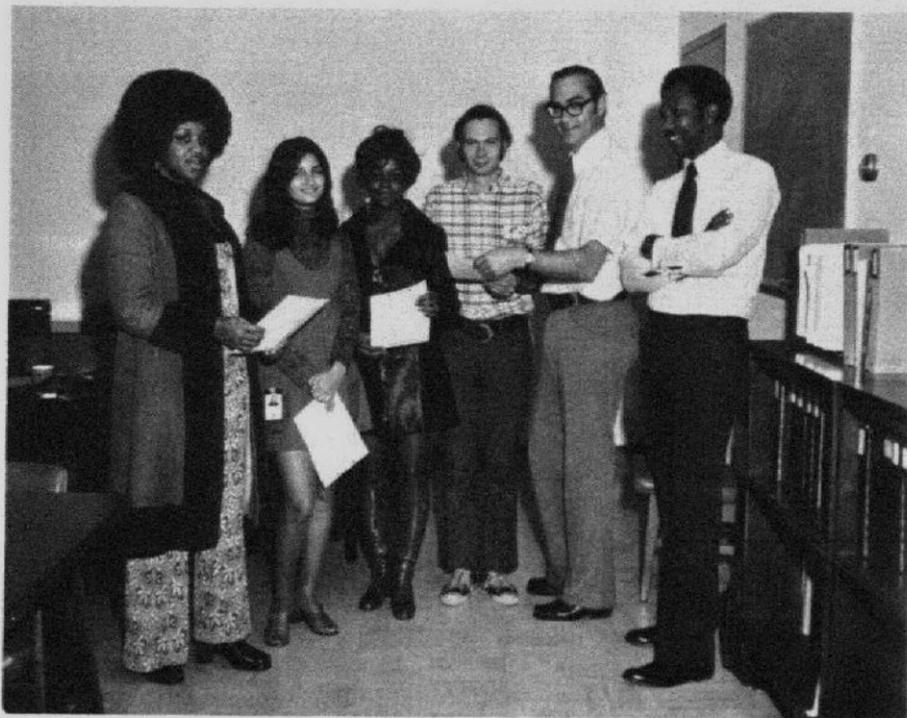
Goddard Historical Essay Contest

The National Space Club recently announced the opening of the Robert H. Goddard Historical Essay Award competition for 1973. The annual nationwide competition, with a \$500 prize, is open to any U.S. citizen.

The contest is named in honor of the world rocket pioneer, Dr. Robert H. Goddard, whose scientific and technological contributions, although belatedly recognized in the United States, helped open the door to space.

Essays may treat with any significant aspects of the historical development of rocketry and astro-

navics and will be judged on their originality and scholarship. They may bring new information to light or may cast a new and different light upon events or individuals influencing rocketry and astronautics in the United States. Entries should be submitted by November 1, 1973 to Goddard Historical Essay Contest, c/o National Space Club, 1629 K. Street, N.W., Washington, D.C. 20006. The winner, will receive the Goddard Historical Essay Trophy, Certificate and a \$500 prize.



Five PSC trainees finish 1st year

Five young students recently completed one year as Ames employees with the Public Service Careers Program (PSC). PSC is a manpower program to employ people with limited education or skills and to upgrade lower level federal employees.

The students are (l to r) Rita Marks, Office of the Director of Life Sciences; Mary Perez, Records and Reports Branch; Carolyn Garth, Accounting Branch; and Richard Taylor, Mechanical Operations Branch. Presenting one-year certificates are Robert L. Pike, (second from right) Chief of the Per-

sonnel Division and Willie L. White, EEO Officer.

Floria J. Allen (not pictured), Avionic Research Branch, also completed one year of training.

The trainees were selected from Civil Service worker Trainee Register.

The government hopes to hire and train 16,000 PSC trainees and to provide training for 6,000 current lower level employees to help qualify them for promotion. Ames will assimilate the worker-trainees into its normal personnel ceiling upon completion of their training.

SHUTTLE

(Continued from Page 1)

designed for zero gravity, will be installed. Airlocks for exposure of specimens or sensors to space will be provided which on some missions may be replaced with high quality optical windows for Earth or celestial observation.

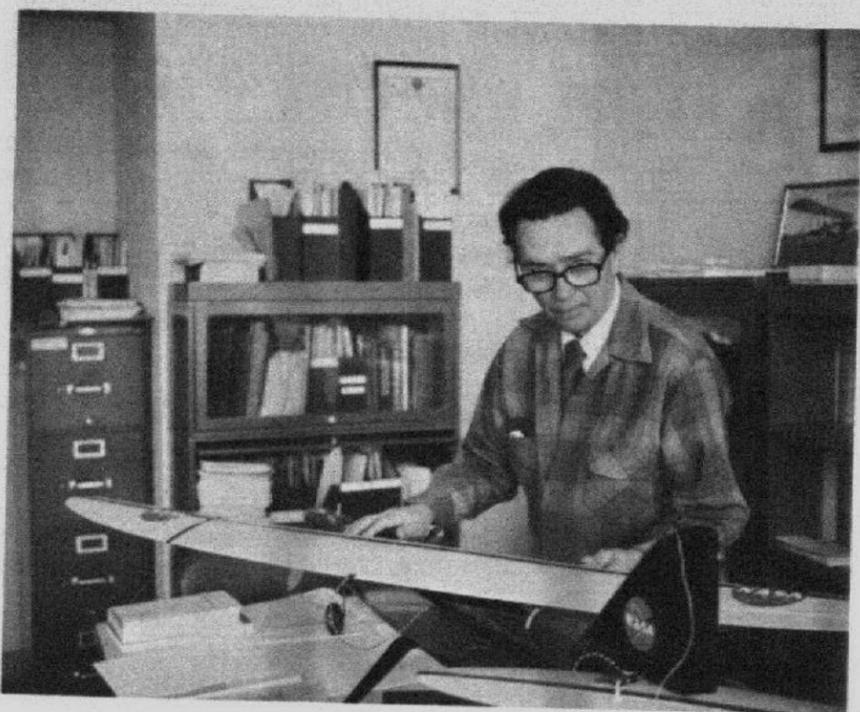
astrogram Admin. Mgt. Building
Phone 965-5422

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 Jeanne Richardson
Reporters NASA Employees

Deadline for contributions:
Thursday between publication dates

R.T. Jones: from elevator operator to aeronautics pioneer



(Continued from Page 1)

"We flew down to Marshall in the evening," says R.T. "I helped the men put on a new set of wings. Then Charles and I went to talk to the president of the company about getting me a job."

"I convinced him I was an aeronautical engineer," he says with a laugh. "The world accepts you at your own evaluation. So he hired me. That was in 1929. It was just before the crash," he says. "Everyone thought the future was in one airplane for each family, like automobiles. So, the company was trying to build an aircraft that would fill the coming need. They cost \$3000 then."

He worked as an assistant engineer and ground school instructor for one year. At the end of the year the company folded under the weight of the Depression. But it had been a productive year for R.T.

He had designed a racing airplane in his spare time. Called the Phantom I, it weighed 300 pounds and flew 200 mph. He entered it in the 1930 National Air Races. "We had made a few mistakes," says Jones, "so we didn't win."

The closing of the Nicholas Beasley Company left Jones unemployed for a year and a half. "I finally got a job as an elevator operator in Washington, D.C. through our congressman," he says.

"It was a very good job," Jones insists. "I had plenty of time to study, and access to the Library of Congress." As an elevator operator during the day, Jones was a student at night. He studied aerodynamics at the Catholic University in Washington. A letter written by the head of the department of Aeronautical Engineering at the university describes Jones' activities:

"This is to certify that Robert T. Jones was admitted to the graduate courses in Fluid Dynamics and Modern Hydrodynamics at the Catholic University of America after passing an appropriate examination to determine his fitness for taking graduate work, but he was not a candidate for an advanced degree. This examination disclosed that Mr. Jones not only was qualified to take the graduate courses but possessed knowledge of a higher order than that normally possessed by graduates of standard four-year courses in engineering. In addition to two years of attendance at graduate lectures at Catholic University Mr. Jones spent at least four hours per day for three years on studies pertaining to the dynamic stability of an airplane for which no official credits were given. He made numerous models and conducted original aerodynamic researches at Catholic University. During the conduct of these researches he developed ingenious methods of mathematically analyzing airplane stability. His work was more than equivalent to that required for a doctor's degree."

In 1971 the University of Colorado awarded Jones an honorary Doctorate of Sciences degree.

Jones' teacher during this period was Maximillian Munk, NACA's first theoretical aerodynamicist and a pioneer in his field. Speaking of Munk, Jones says, "I learned more from him than anywhere else." I like to consider myself a student of Max Munk."

In October, 1934, his career as elevator operator and student ended. And, his career in Federal Service began at Langley Memorial Aeronautical Laboratory in Virginia.

"When Roosevelt got into the presidency," says Jones, "things began to open up. Temporary positions, nine-months long, were especially available. After nine months the economy was supposed to be able to absorb these employees. In 1934 I was hired under this plan at Langley as a junior scientific aid."

He worked for Langley several years, remaining in what was called a sub-professional rating. When he had gotten to the top of that scale Langley started looking for ways to give him a professional rating. But, "Professional-One" clearly required a bachelor's degree. The "Professional-Two" description didn't mention the subject, however, so Jones was promoted directly to "Professional-Two."

In the early 1940's he began working on a theory dealing with the aerodynamics of wings; a three-dimensional concept. "Engineers at that time were trying to solve problems connected or related to the affects of compressibility," says Jones. "Most engineers were concerned with the section shape of the wing. That's when I got the idea for a low-ratio aspect delta wing, or the "swept-wing."

Jones wrote a paper describing his "swept-wing," but it was rejected by the NACA editorial committee. Soon afterward World War II ended and Americans were going through Germany's aircraft factories and wind tunnels. They found the Germans had already begun tunnel tests on a swept wing aircraft. In 1947 Jones' paper was published.

The paper indicated at that time that a slant wing, like the one recently revealed to the public, would be more efficient. But, most people, including Jones, were content with the revolutionary swept-wing.

In 1946 Jones had come to Ames where he had begun working on a supersonic wing theory and a book called, "High Speed Wing Theory." While co-authoring the book with another Ames employee, Doris Cohen, Jones noticed that the slant-wing was mathematically more efficient than the swept. But, again the idea was not developed.

After a brief period, during which he worked on the design of heart pumps at the Avco Everett Research Laboratory in Boston, Jones returned to Ames at the invitation of Hans Mark, Ames Director, to help design a supersonic transport aircraft.

In an effort to solve the problems of the SST and the French, Concorde, Ames wanted to design a supersonic transport that could fly at low Mach numbers (M 1.0 to 1.5) without creating a supersonic boom. Jones immediately thought of his slant wing.

A model was built and tested in Ames' supersonic 11-foot wind tunnel. The test showed the new design was more efficient than the swept wing.

"The next question," says Jones, "was whether such a crazy thing could fly. Will it be stable and controllable?" To prove this Jones built two radio controlled models in his home workshop and flight tested them. "We were able to do perfect rolls and loops, and demonstrate it's maneuverability at 45 degree angles and beyond," says Jones.

"There's a good chance commercial aircraft companies will adopt it," he predicts. "It offers promise of solving problems that the Concorde couldn't.

Two studies are now underway to test the design for passenger transport aircraft. Under Thomas J. Gregory, Chief, Advanced Vehicle Concepts Branch, a group here is examining the idea for a 200-passenger transport, and NASA recently awarded Boeing Company a contract to conduct a parallel study.



That Old Gang of Mine

The San Jose Chapter of National Association of Retired Federal Employees, pictured above, get together each month to share common and uncommon interests.

The meetings, held at noon the first Friday of each month at the Royal Fork Buffet, 1730 W. Campbell Ave. in Campbell, are entertaining and valuable.

The national organization provides its members with group rates on all types of insurance. A monthly magazine, "Retirement Life," keeps the group informed on legislation benefits, and activities affecting retired Federal employees.

The local chapter extends an invitation to all Ames retirees and retirees-to-be to join them.

The San Jose Chapter is pictured above. They are: (l to r, front row) Mrs. Milton Evans, Mrs. Phil Ekholm, Mrs. Robert Ross, Mrs. Henry Citti, Mrs. Joseph Quartuccio, Mrs. Lynn Little, Mrs. Howard Maxwell. (l to r, second row) Mrs. Wm. L. Giusse, Wm. L. Giusse, H.C. Sliech, Graham May, Phil Ekholm, Anthony Quartuccio, Bob Ross, Tony Perry Marvin Yockey, Jennie Berti Victor Bayard, Mark Klichan Lynn Little, "Shorty" Joe Quartuccio, Milt Evans, Byron K. Bullard, Howard Maxwell.

Happenings

March 26, 10 a.m., bldg. 239, B39 Dr. John Hayes, Indiana University "Chemical Correlations in the Carbonaceous Chondrites - In Particular the Distribution of Carbon"

March 24 - AIAA field trip to Vandenberg Air Force Base and joint BBQ-dinner. For information and reservations call before March 17, Walt Reinhardt, 961-9058 or A.S. Mays, 327-2622.

March 28 - AIAA dinner meeting at San Jose Hyatt House, 5:30 p.m. Cost \$6.50. Lecture by Arthur Clarke, co-author of 2001, A Space Odyssey. For reservations call by March 26: Joan (Ames) 965-6440, or Stanford, 321-2300, ext. 4061.

March 31 - AIAA visit to aircraft carrier Kitty Hawk, Hunters Point Naval Shipyard, San Francisco. For reservations call before March 30: Al Mays, 327-2622 or Ray Wille 739-4880, ext. 2704.

March 26-30 IEEE INTERCON-1973 International Convention & Exposition, New York City, New York.

April 2, 1 p.m., H. Julian Allen Awards presentations in Ames Auditorium.

JOGGERNEWS

Although the Joggerman Iron Man Program (previously called the 500-Mile Club) has only been in existence since December 1, 1972, the response has been enthusiastic with several reaching 500, 250 and 100 mile goals.

On April 7 the Joggerman are sponsoring a 10-mile DeAnza Ridge Run (AAU sanctioned), which will begin at Monta Vista High School at 9 a.m. The entrants will run, jog, or walk the hills to Stevens Creek Reservoir and back, a difficult but beautiful, course. Please contact Jerry Barrack if you are willing to observe, participate, or help, at ext. 6093.

WANT ADS

AUTOMOBILES

FOR SALE

62 Chev. sta.wag., auto., runs, air, radio, heater, needs frnt. body wrk. Raul, 227-5307.

61 Cad., runs ok, gd. trans. car, \$75, call 257-4971 after 5 p.m.

68 VW, one owner, 47k miles, ex. cond., radio, asking \$1,000, 267-2291

MISCELLANEOUS

FOR SALE

Orig. oil paintings, Girl's Schwinn bike, call 734-3368, after 5 p.m.

H/B Powerbilt lefthandmen's irons 2-9 & pitching wedge, \$45, 736-1475 after 5:30 p.m.

Skis, Hart standards, 185 cm., step-in bindings, ex. cond., \$60. Lynn, 965-1687.

File cabinet, 4-drawer, 3x5 cards, \$7.50, 739-2306.

Picture or shelf glass 20¢ sq. ft. 739-2306.

Mag wheels, \$100. 2 - 6.75x14, 2-7.50x14. 736-0352.

Twin-sized rollaway bed, little used, gd. cond. 961-3492.

Potters ceramic kiln, front load, electric w/ accessories. \$65, 243-3184.

14' Jack Salmon fiberglass sloop, 3 sails, tilt trailer, ex. cond. 253-7945.

Hand saws, all sizes, 50¢ each, 3 ft. scythe, \$2, Silvertone table radio free. 739-2306.

5 yr. old registered quarter horse w/ tack, Milpitas area, 262-6084, after 5, \$600/best offer.

Heathkit capacitor checker, model IT-28 assembled, in perfect wrking cond., \$30, Earl Menefee, 243-5382.

Console cabinet for Singer or other standard sewing machine \$15, 263-2195.

Fleischman H.O. model train, 5 engines, 29 cars, 332 piece track, plus collectors set. Ex. cond., 266-4513.

Apache camper, Silver Eagle tent trailer, sleeps 4, ex. cond. \$500 245-5836.

Bausch & Lomb 35mm slide projector w/ 17 slide trays, ex. cond. \$50, 245-5836.

10-spd. man's bike in gd. cond., 26", Huffy, \$40, phone 253-4475.

Good buy-guitar classical size, \$25 call B. Bramblitt, 629-8991, after 6.

'71 Sherwood tent trailer, sleeps 6 asking \$595/best offer, 225-6550.

WANTED

Enlarger w/ 50 & 75mm lens, & any other drkrm equip, 243-3184.

Bessler 4x5 enlarger, 247-6954.

Photo. drkrm equip., especially enlarger for 35mm or larger format. 263-2195 after 5 p.m.

LOST

Deck of computer cards, mailing list for 91 CM AIRO project. If found contact 5338.

April 1 deadline

April 1 is the deadline for receipt of applications and required attachments for the Federal Personnel Council Scholarship Program. Information may be obtained from: Mr. John Sergeant, Civilian Personnel Office, Building 227, Presidio of San Francisco, CA, 94129. Telephone 561-4242.

ACE Spring Schedule

The following ACE television classes begin the week of April 2. Day and time of classes are shown in parenthesis.

Management by Objectives, (Th. 5 - 6:30 p.m.)

Creative Technical Presentations (T. 5 - 7 p.m.)

Math Review - Trigonometry (T. & Th. 12 - 1 p.m.)

PL/1 Programming Language (MWF 12 - 1 p.m.)

Cooling of Electronic Equipment (Th. 5 - 7 p.m.)

Effective Reading (T. Th. 12 - 12:50 p.m.)

Personal Financial Development (MWF 12 - 12:50)

Shorthand Review (T. Th. 12:15 - 12:45)

Introduction to Statistics (Th. 5 - 7 p.m.)

Human Relations (T. 5 - 7 p.m.)

Principles of Management (T. 5 - 7 p.m.)

Communication and Organizational Behavior (M. 5 - 7 p.m.)

For further information contact the Training and Special Programs Branch.



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

SPARCS sets new record for fine pointing

A slim rocket is shot 135 miles above the Earth. Small air jets in the rocket's sides stop ballistic spin, and coarse sun sensors roughly point it in the direction of the sun.

In position above the Earth's obscuring atmosphere it sheds its nose cone and fine sun sensors point and lock the rocket's nose directly toward the sun.

Ames' Solar Pointing Aerobee Rocket Control System (SPARCS), on its 32nd launch, sets a new record pointing its x-ray telescope at the sun to within 0.1 arc second. It is equivalent to hitting the edge of a dime from one mile away.

It is the best fine pointing, without additional fine guidance within the telescope itself, ever achieved in flight during the history of the space flight program.

Previously, the best fine pointing stability was about one arc second.

This new fine pointing capability is expected to allow scientists to obtain significantly improved data on the sun. The scientists from American Science and Engineering, Incorporated, who built the x-ray telescope are enthusiastic at the potential of their data.

The breakthrough was achieved with SPARCS IV, which uses a new fluidic thruster conceived, patented, and developed by Ames. The key to this super fine pointing is the smooth proportional output of the fluidic thruster. This achievement is a result of several years of effort at Ames devoted to the advancement of the state-of-the-art in sub-arc-second pointing using gas thrusters.

The x-ray telescope had been successfully used during a previous launch. On its way back from the launch site at White Sands Missile Range, New Mexico, aboard a TWA cargojet, it crash landed into San



After a successful launch and recovery the x-ray telescope from Ames' Solar Pointing Aerobee Rocket Control System (SPARCS) crash lands on its way back to Ames into San Francisco Bay aboard a TWA cargojet. The telescope was later refurbished and launched to a record-breaking performance.

Francisco Bay. It sustained little damage, however, and was refurbished and reused during the record-breaking flight March 8.

The highly successful SPARCS has become the backbone of NASA's solar sounding rocket program. Ames provides complete payload support for solar scientists, and is sometimes required to launch several rockets in close succession.

Harvard College Observatory scientists with an experiment aboard the SPARCS IV, who have flown their experiment three times before, called the mission a real success, and said it was "as perfect as can be, the best ever."

Twenty-one more launches are scheduled before the end of fiscal year 74. A third of these will directly support the Skylab Project as part of the Calibration Rocket pro-

gram (CALROC). Since the CALROC launches have a critical role in support of the Skylab experiments before and during the Skylab flight, an unusually high degree of confidence in the reliable and precise operation of SPARCS is required. SPARCS has an excellent record of reliable performance and are frequently reflown three and four times following recovery by parachute.

The SPARCS Project is managed by Edward A. Gabris, Flight Project Development Division. Gabris and his staff manage all SPARCS development and launch activity, including development of complete experiment payload support systems. Lockheed Missiles and Space Company in Sunnyvale builds the SPARCS systems for Ames.

Saturn rings appear to be rocks

The rings of Saturn appear to be made of solid chunks, perhaps rough and rocky, rather than of gas, ice crystals or dust.

That is the finding of two Jet Propulsion Laboratory radar astronomers after history's first successful radar probing of the huge planet, 700 million miles away.

Using NASA's 210-foot antenna at Goldstone Station on the Mojave Desert, Dr. Richard M. Goldstein and George A. Morris, Jr. directed the 400-kilowatt radar beams at Saturn and its rings a dozen times during December and January and reported these results:

"We received much stronger bounceback signals than we expected from such a distance. From our radar results, the rings cannot be made up of tiny ice crystals, dust or gas. Our echoes indicate rough, jagged surfaces, with solid material 3.3 feet in diameter or larger. Possibly much larger."

Dr. Goldstein warned, moreover, that Saturn's rings, encircling the planet from 57,000 to 85,000 miles out, "must be considered an extreme hazard to any spacecraft sent into or near the rings."

NASA plans to send a Mariner spacecraft past Jupiter and Saturn in 1977.

Many space scientists and astronomers believe Saturn's rings are very thin and consist of ice crystals, dust particles or gas, or some combination of these. But the relatively strong radar echoes contradict some of the old theories, according to Goldstein.

"The signals from the rings were five times stronger than Venus would be at that size and distance," said Goldstein, who, in the past decade, has probed Venus, Mars, Mercury and Jupiter via Goldstone radar.

"The planet is not a good radar reflector, but the rings definitely are," Goldstein said. Then he added, "The ring chunks certainly have to be closely packed, although not too closely because starlight has been seen shining through them. They cannot be much smaller than one meter in size and may be much larger."

Basic Research Review Available

Ames Basic Research Review summary volume, describing the Center research program for FY73 is available to employees. This is material presented to the OAST Research Council on Aug. 8 and 9,

1972, and consists of viewgraphs shown, plus abstracts of individual presentations. Those organizations or individuals desiring to have copies may call Betty Kay at ext. 5684

Director's Report

Dr. Hans Mark, Ames Director, delivered his Annual Report to the Center to Ames' organizational directors and deputy directors, division and branch chiefs, on March 22 in the auditorium. The text of his speech is printed, in full, on pages two and three of this issue.

Director's Annual Report to the Center - "adverse factors"

This report marks the beginning of my fifth year with you at Ames. Before I go on to the substance of my remarks, let me make a few personal comments. The past four years have been extremely rewarding for me. I am very grateful to have the opportunity to work with you and it has been a profound pleasure for me to acquire so many new friends who are now, by the way, beginning to be not so new any more. I don't know precisely at what point someone turns into an old friend, but I am already drifting into the pattern of thought where I do regard many of you as old friends. This is a good feeling and I am very grateful to all of you for your help and friendship in these difficult times.

Let me now review some of the events of the past year and then try to make some projections of what lies ahead of us. I will start by discussing some of the bad news first in the style of the now commonly used figure of speech. As you know, there were two major projects that the Center tried to obtain in the fiscal year 74 budget that did not materialize as new starts -- QUESTOL and Pioneer Venus. Both of these programs were victims of the circumstance that NASA was unable this year to maintain a level budget -- that is, a fiscal year 1973 budget equal to that of fiscal year 1972. A cut of about \$200 million was made in the current fiscal year 1973 appropriation last December and this, of course, makes it virtually impossible to push through any new starts for fiscal year 1974. The budget cut of last December is, of course, also the cause of the current shift in our financial management policies. In the past we have tended to manage our budget in terms of new obligational authority (NOA) that was given to us each fiscal year. As you all know, under the new situation we have to manage the accrued cost and then the actual disbursement of the funds that we are given. I am fully aware that the changeover from managing obligational authority to disbursements has caused some very real dislocations for all of us. I must admit to something of a management failure here, because I believe I should have anticipated the declining budget and the changed management systems that would be necessary to handle a declining budget of the kind we are facing. The failure to do so caught us short and has created some very serious program discontinuities. The new system that is being worked out now will hopefully ease the situation somewhat even though it is unlikely that more money will become available. The best I can say is that we will learn how to live with a new set of rules. Although the fiscal year 1974 budget calls for much the same NASA funding level as that in fiscal 1973, I expect that further cuts of the kind we saw in December 1972 will be forthcoming, and I can promise you that at least this time we will be ready for them.

In terms of Civil Service manpower, you all know that we have been asked to decrease our personnel ceiling from 1,729 on July 1, 1973 to 1,699 on July 1, 1974, a total of 30 positions. It is possible that we will be asked to take a larger cut should the fiscal 74 budget be changed in the middle of the year as was the case in fiscal year 1973. A Civil Service level of 1,700 employees brings the Center back to the population that it had in 1963. I believe that we should anticipate further reductions over and above those that have already been assigned to us since the near term political and economic situation in the country seems to dictate such actions. Finally, I should mention that we were unable this year to secure any support for our major Construction of Facilities proposals for FY 1974. This is particularly painful since the Vertical Motion Simulator that we had proposed would have significantly increased our ability to reproduce more faithfully the flight conditions in STOL and VTOL vehicles. We have resubmitted this construction item for FY 1975 with somewhat reduced capability and a consequent reduction in cost.

Some of the adverse factors that I have outlined above have been balanced by some very real achievements of which we can all be proud. In my report to you last year, I said that success in our projects is of the utmost importance since we will be judged more than ever on this point. I am very pleased and proud to say that you have come through in a truly magnificent manner. Let me

cite some examples. Pioneer 10 is working extremely well and has received considerable attention in the national press. There is no question that Pioneer 10 is one of the most significant NASA missions to date, and I am certain that much that is new will be learned about the planet Jupiter during the flyby in December. We can only pray that Pioneer G, which will be launched in a few weeks, will do equally well. Even though we do not have a new start on Pioneer Venus, we are still working on the project and are going ahead with the science selection and hopefully with the selection of a single Phase B contractor in the near future. There is at least a reasonable hope in my mind that something will come of all this effort. The Pioneer Venus program, as you probably know, has been criticized on the ground that the Soviets have already been to Venus and that, therefore, it is unnecessary for us to repeat the experiment. Let me remind you that the Soviets launched the first earth orbiting satellite, put the first instrumented animal in orbit, performed the first manned orbital flights, landed the first probe on the moon, took the first pictures of the far side of the moon and landed the first probe on the planet Mars. In spite of all this, there can be no doubt that the new scientific information has come preponderantly from the American missions. An American discovered geomagnetically trapped radiations Americans made the first high resolution pictures of the moon and Mars and we are, of course, far ahead of them in lunar exploration. I believe that the situation with Venus is quite similar. There is no doubt in my mind that the Pioneer Venus as presently planned will yield much more information about the atmosphere of Venus than the Soviet probes have been able to reveal to us in the past. In view of the record, I think it is important not to be discouraged by the mere fact that the Soviets have been there first. We will continue to make every effort to obtain a new start for Pioneer Venus as soon as possible.

In the area of propulsive-lift aircraft technology some very interesting developments are in the offing in spite of the failure of the QUESTOL project to gain approval. As you know, we have been conducting exhaustive and successful flight tests with the modified jet STOL C-8 Buffalo. This aircraft is currently the only jet propulsive-lift airplane in the country that can answer some of the questions that might be important in the application of propulsive-lift aircraft to a civil transportation system. This program is being jointly conducted with the Federal Aviation Administration and there is little question that much valuable information will come from the work now being done with the C-8.

The major new experimental aircraft program that will be carried out by the Center in the next few years is in the field of propulsive-lift aircraft. This program will lead to the creation of a tilt-rotor research aircraft which will be used to explore the technical aspects of this particular propulsive-lift concept and will attempt to determine its applicability to various military and civil missions. The program has been approved and will be carried out jointly with the U.S. Army's Air Mobility Development Laboratory.

Finally, I should mention some of the activities we are planning to follow the QUESTOL program. As you may know, the United States Air Force has reached a decision to make a heavy investment in the development of an advanced medium STOL transport prototype (AMST). In my view, this makes it very likely that propulsive-lift technology will eventually be introduced into the civil market. Remember that the military route has been the traditional one by which the country introduces new aircraft concepts into the civil system. The usual method is that the military provides the funds for the technical development of a certain aircraft type which then evolves into an acceptable civil version. The example of the large swept-wing all jet bombers that were developed in the early 1950's and then metamorphosed into the successful civil Boeing 707 and its derivatives is well known. The Center has a deep commitment to propulsive-lift technology and we believe that the U.S. Air Force program will be a most significant factor in the advancement of this technology. There is also no question in my mind that we at Ames will be heavily involved in the AMST pro-

factors . . . balanced by some very real achievements"

gram. I am speaking here of flight simulations and flight experiments that will be done with the AMST prototypes when they become available. We have recently established an organization at the Center, the Quiet Propulsive Lift Aircraft Technology Office, that will develop a joint NASA-Air Force program to bring this technology to civil applications as soon as possible.

A most significant development that occurred during the past year is that the Illiac IV computer is now working on a limited basis. The machine was accepted from the contractor by the government last December and the first programs were run late in January. There is now good reason to hope that we will be able to perform very sophisticated calculations in fluid mechanics in the near future using the Illiac IV computer. Hopefully, this circumstance will put Ames in a leading position in this particular field. The work on the ARPA network is also progressing satisfactorily. There are now more than 30 users on the network. It is true that much remains to be done in developing the software in the operating systems for the ARPA network and also for the Illiac IV computer itself. However, the promise is great and I believe that we may well hope to see Ames become one of the two or three leading computer centers in the country.

Significant progress has been made during the past year in the field of flight simulation. The Ames-FAA Office is now a going concern, and Mr. Jack Cayot and his people are working on the development of certification criteria for advanced STOL aircraft. The flight simulator for advanced aircraft also played a very significant role in the QUESTOL and the Tilt-Rotor Experimental Aircraft design competitions. I think it is safe to say that we have proved in the course of this work that high fidelity flight simulation can be an extremely useful tool in the development of new aircraft. Another item related to our work in flight simulation is that the U.S. Air Force Scientific Advisory Board has chosen Ames as the site for its major Spring meeting in May the theme of the SAB meeting will be Flight Simulation.

In other research areas I am also pleased to report to you that substantial progress has been made. Take, for example, the work we are doing in support of NASA's Applications program. Two years ago our funding in this program was approximately half a million dollars and today it is of the order of five million. This is clearly a graphic example of our response to the reorientation of national priorities. We now have to prove that the Center is flexible enough to make important contributions in Applications in the future. We have asked for and received the lead Center role in the aircraft applications program. I believe that this is an extremely important function since aircraft provide a flexible and important means to carry out many of the applications experiments. In the airborne sciences we have in the last year conducted two major expeditions with the CV-990 aircraft. Both of these were done in collaboration with scientists from the Soviet Union. The first was an expedition based in Africa to measure the productivity of the equatorial regions in the Eastern Atlantic, and the other just completed was the expedition to determine the arctic ice sea interface relationship in the Bering Sea. The represent genuine cooperative efforts and once again illustrate the usefulness and flexibility of the Airborne Laboratory for the accomplishment of many scientific purposes. To summarize then, our experience over the past year has shown that we can acquire new and important programs at Ames provided that they are not costly. It also helps if they are performed jointly with another agency of the federal government.

It is appropriate that at this point I also mention several other things. It has often been said that when financial support is hard to come by, basic research suffers more than other areas. This is probably true and yet in spite of that, the Center has a number of remarkable scientific achievements to its credit in the past year. For example, Helmut Poppa was awarded NASA's Distinguished Scientific Achievement medal for his remarkable work in the field of electron microscopy. Many of you probably know that this work has received nation-wide attention. Webb Haymaker and his colleagues were able to overcome many difficulties and succeeded in

putting a light experiment on Apollo 17 which will allow us, for the first time, to make a systematic examination of animal brain tissue that has been exposed to the radiation environment of outer space. There is no question at all in my mind that this experiment could have very significant consequences for the long term planning of manned space missions. The Ames work in the magnetic structure of the moon has received national recognition and both of the principal investigators involved, Drs. C.P. Sonett and Dr. Palmer Dyal, have been awarded NASA's Distinguished Scientific Achievement medal for their work. Finally, our work in exobiology and the search for life elsewhere is still as intellectually stimulating as ever. Work on the Viking life detection package, for which we have a major responsibility under the direction of Dr. H.P. Klein, is well along to completion. With the new Mariner 9 results indicating evidence of water on the Martian surface, there is again hope that positive results can be obtained from this effort.

In other fields related to more direct practical applications, Hubert Vykukal was awarded NASA's Distinguished Scientific Achievement medal for his work on life support suits designed for use in future manned spacecraft. An important feature of this work is that it has had immediate applications in medical therapy for people who have diseases requiring certain prosthetic devices. In aeronautics, Ames has led the way in developing operating procedures for commercial aircraft that will significantly reduce the noise level in communities surrounding airports. This is an extremely important undertaking that requires the utmost care and technical skill since we must be absolutely certain that the new procedures are as safe as the ones they will replace. We have made significant progress in this endeavor and there is hope that the commercial airlines will adopt the new flight procedures in the next couple of years. Finally, I am pleased to announce that Woody Cook was awarded NASA's Exceptional Service Medal for his work on the development of new V/STOL vehicle concepts.

It is obvious that even in our present austere circumstances, good scientific work is possible and recognized.

What about the future? I certainly cannot offer any easy answers. It is clear that we are in for more difficult times. We will be under closer scrutiny than ever before to justify what we are doing. Let me stress that it is not enough to simply say that we have a "great team" and that good things are bound to come from it. This kind of argument is simply no longer acceptable in today's political environment. It is most important to determine whether people inside NASA as well as outside really need what we can produce. This is the reason why contacts with other state and local agencies are so important, and we will continue to develop these as vigorously as possible.

Four years ago, in my first talk to this group, I cited instances where the technological values that we represent were being seriously questioned. While this is still going on, I do detect some bright spots on the horizon that might indicate a change in attitude toward science and technology. The most important of these is that enrollments in technical and engineering schools are no longer declining precipitously. Young people apparently are once again recognizing the value of "hard" knowledge based on tight intellectual discipline. Closer to home, another indicator could be the phenomenal success of the lecture series in "Cosmic Evolution" that we co-sponsored in San Francisco. Over thirty thousand people attended the series of 13 lectures. I believe that this is an example of latent interest in the kind of things we do that we have simply not properly tapped.

What I can offer you then, in view of this situation, is continued challenge and the opportunity to think about and to work on difficult and complex problems. Even though I believe the intellectual tide in the country is still running against us, we must hold on until people once again realize the importance of scientific research and the fact that the rational application of the physical principles flowing from this research is the key to solving most of the problems facing this country.



THE BEER BARRELS . . . won first place in the 1972-73 All-Ames Basketball League. Winning team members are (l to r) George Ishiguro, Mike Green, Dave Peterson, Mladen Chargin, Paul Soderman, Frank Steinle and Jim Myers.

Science Fairs - A Pair

Ames employees are invited to attend the Thirteenth Annual Santa Clara Valley Science Fair, Saturday, March 31 at the Santa Clara County Fairground's Pavilion on Tully Road in San Jose. The Fair will be open to the public, free of charge, from 9 a.m. to 7 p.m.

The Santa Clara Valley Science Fair is sponsored by firms interested in promoting scientific research. Ames has been a supporter of the Fair for several years. This year the Center will again provide two \$600 work-research fellowships to science fair winners.

Dr. Paul X. Callahan, LRE, Director of the fair, will be responsible for selection of the winners. The fellowships will enable students to conduct research at Ames during the summer of 1973. Several Ames scientists will also act as judges during the fair.

The fair has two major divisions; biological science and physical science. Within these divisions are twelve categories of entries to be judged by grade level. To date, over six hundred entries have been received.

Two grand prize winners in the senior division (grades 10-12) will be chosen by the judges. They will be awarded trips to the International Science Fair where their projects will be entered in competition with others in the same categories from elsewhere in the U.S. and from many foreign countries.

Verlin D. Reed, FAX, will represent Ames at the international fair as a judge. It will be held in San Diego May 10, 11, and 12.

The San Francisco Bay Area Science Fair will be held April 7 through 11, at the California Academy of Sciences, Golden Gate Park, San Francisco.

Ames has been invited to send scientists and engineers to a "Scientists' Night" - a preshowing of the Fair projects - on Thursday evening, April 5, at 6:45 p.m.

The Chairman of the Fair said in his letter of invitation:

"Your scientists and engineers are invited to attend this private showing of the Fair . . . to discuss the various projects with the student exhibitors. Your representatives are an important contact for these young scientists, and can help shape their futures with words of encouragement."

For those who wish to attend, invitation cards are available by calling the Educational Programs Office, extension 6364, 5543 or 5544.

Trip to Greece available

The Headquarter's NASA Employees Club trip to Greece has space on the flight and limited space on its land tour. At this time the three and four day Island cruises are full. The flight leaves from Dulles Airport, Washington, D.C. to Athens, Greece on May 16 and returns on May 31.

For reservations and information contact G. Degennaro, Code FAP, NASA Headquarters, 755-8541.

WANT ADS

AUTOMOBILES

For Sale

Honda CB 350 '72, like new, low mileage, many extras \$595, 244-3528 after 5 p.m.

71 Sherwood tent trailer, sleeps 6, asking \$595/best offer, 225-6550.

71 custom Chevy w/ non-overhead camper, AT, AIR, PB, PS, R/H, \$3500/offer, 225-6550.

69 Pontiac Catalina, 2-dr. htp, auto power, low mileage, ex. cond., \$1,650 657-0921.

HOUSING

FOR SALE

Aristocrat housetrailer 16', sleeps 8 butane refrig., floor furnace, clean, \$1095, Bill Morgan, 252-5596.

4-br, 2 1/2 ba., 2100 sq. ft., near Mt. Pleasant Golf Course, \$37,000 238-0129.

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

FOR RENT

Condominium, \$175, 2-br, w/w carpet, cabana facilities, call 258-2933 after 5 p.m.

3-br cabin, 10 min. to Dodge Ridge, all elec., dishwasher, stereo, 408-294-9289.

WANTED

Responsible girl to share w/ 2 others, 3 br apt., \$100 or less, 961-3492 eve.

Female to share nice Sunnyvale 2 br, apt. \$87, plus elec., 961-8655, ask for Brownie.

MISCELLANEOUS

FOR SALE

Beagle 2-yr-old, reg. AKC, spayed fem., \$15, likes kids & TV, 258-8295, evenings.

Super garage sale, Sat., Mar. 31 & Sun., April 1, call Earl Menefee 243-5382.

Internatl 420 class fiberglass sailboat, like new, many extras, new trailer, \$1250, 732-7628.

Canadian ice skates, complete w/ ankle supports, skate guards, size 3,4,5. \$6.50, 739-2306.

Mouse maze, 2 ft. x 3 ft., complete enclosed, great for school project, \$2.50, 739-2306.

Formica table top w/ legs (60x40) can be second dining/study table. \$28, 321-1858.

Matching twin beds w/ nightstand, \$85, will sell separately, 321-1858.

Stereo receiver, Scott model 380 am/fm tube type, \$90/offer, Bill Rose 867-2098.

4 solid maple doors, asking \$20 for all, call 298-5010 after 4:30 p.m.

Honda parts, 6" chopper forks for 350 cc new, \$50, TT pipes for 175 cc, \$10, 379-2385.

Youth bed w/ mattress, \$35, dresser \$20, in gd. cond., call eve. 945-9559.

Boy's 16" Schwinn bike w/ training wheels, ex. cond. \$25, 657-3393.

Golf clubs, power bilt, womens/junior, complete, bags, balls, carts elec. putt return, \$80, 365-0578.

6-mo. old female Keeshound/Australian sheep dog, grows to 18", 296-6741.

LOST BOOK-Rinehart mathematical tables by H.D. Larsen. (Borrowed from Stanford) Call 5157 or return to Ames main library, 202-3.

15 gal. aquarium, complete w/ stand \$20, also sofa, tables, lamps, 263-1636 after 5.

Binoculars, Swift -7x35 coated optics, \$30, pocket calculator, Cimatron \$60, call Tom Quever 293-8498.

35 mm Agfa camera w/ case & lightmeter, very gd results, ex. cond. \$25, 321-1858.

Small, used, wrking air conditioner 253-5946.

1 girl's and 1 boy's small Schwinn bikes, both need paint, \$15 each, 657-9296.

Russian Wolfhound puppy, female, gd. show potential, grt w/ kids, 657-9296.

Boy's 10-spd. bike, ex. cond., large frame, 296-5914 after 5 p.m.

19" RCA portable TV and 23" Packard Bell console TV, good cond. \$15 ea. 736-3984.