

**COURSE IN SOLAR PHYSICS**—A group of Skylab support personnel at the Manned Spacecraft Center are shown in a classroom session on solar physics. (l. to r.) Mason Lancaster, James E. Bodmer, Abelino B. Sanchez, Alan C. Holt and John W. Samouce (with pointer) observe a televised picture of the sun being piped to the classroom from the MSC solar telescope.

**GETTING 'SMARTS'**

## Astronauts, Technicians Probe Solar Physics Secrets in Preparation for Skylab Missions

While the majority of activity at NASA's Manned Spacecraft Center is directed toward the upcoming moon landing of Apollo 14, a group of astronauts and technicians are learning all they can about the sun.

The astronauts and about 50 support personnel at MSC are taking a special course in solar

physics. The curriculum of the graduate level course includes a discussion of solar terrestrial effects, problems to be resolved in solar physics and observational characteristics of a variety of solar phenomena.

The purpose of the course is to provide the potential Skylab crewmen with a background in

solar physics and observing which will enable them to efficiently operate the Apollo Telescope Mount, one of the primary scientific objectives scheduled for Skylab. The astronauts are being trained to be solar observers with an intuitive feel for the physics behind the solar phenomena.

There are a number of transient events on the sun which emit bursts of radiation in the x-ray and ultraviolet wavelengths which can only be observed from above the earth's atmosphere. The Skylab manned telescope provides the capability of recording these events in high spatial and spectral resolution in the ultraviolet, x-ray, white light and hydrogen-alpha bands. The transient events are particularly prominent in and around active regions on the solar disk (or in the corona).

Of the astronaut's role in the ATM, Scientist Astronaut Owen K. Garriott said, "the crewmen will provide the desired flexibility and reliability in selecting targets of scientific interest and pointing of the ATM."

"The solar physics course," Dr. Garriott said, "provides the crewmen with the background and training in recognizing, understanding, and responding to solar phenomena and events required to operate the ATM in an efficient manner."

The astronauts and support personnel have completed half of the 60-hour course started Oct. 19, 1970. When the classroom portion of the course is completed, sometime in late January, the astronauts are scheduled to gain real-time experience in use of solar telescopes and associated equipment at Sacramento Peak Observatory. (Continued on Page 2)

## Soviet Scientist is MSC Visitor Today

An eminent Russian scientist, an official of the USSR, today is visiting the Manned Spacecraft Center as the guest of Director Robert R. Gilruth.

Dr. Alexander P. Vinogradov is head of the Vernadsky Institute for Analytical Chemistry and Geochemistry in Moscow. He is also a vice president of the Russian Academy of Sciences.

Vinogradov has been in Houston for the past week attending the second annual Apollo Lunar Science Conference at the Albert Thomas Convention Center.

Yesterday he presented a paper to the delegates on preliminary results of the Luna 16 mission. That unmanned Soviet spacecraft flew to the Moon last year, scooped up a couple of ounces of lunar dirt and returned to Earth landing in the Soviet Union.

Vinogradov's itinerary—tentative at Roundup press time—was to include tours of the Mission Control Center, the Lunar Receiving Laboratory, and the Space Environmental Simulations Laboratory.

He was also scheduled to hold lunar scientific discussions with the MSC staff.

Dr. Vinogradov and more than 600 other scientists have heard over 200 scientific and technical reports on the lunar samples returned to Earth by Apollo 11 and 12.

## PAO Staffer Dies in Home

Mrs. Grace K. Winn, a special assistant in the Public Affairs Office, died at her home in Houston on January 4.

Mrs. Winn was born in Waxahachie, Texas. Moving to Houston in 1943, she opened an employment agency and operated it until 1956 when she moved to Washington, D. C., as International Representative of Beta Sigma Phi Sorority. In November 1961 she returned to Houston as Director of Relocation for the newly formed Manned Spacecraft Center.



Mrs. Winn will be remembered by many MSC employees and their families as one who provided assistance in establishing them in (Continued on Page 4)

Also included during the conference were results of the Apollo Lunar Scientific Experiments Package (ALSEP) which was set up in the Ocean of Storms by Apollo 12.

Nearly 100 foreign scientists, including Iron Curtain country representatives, attended the sessions.

## ASME Award Goes to Center Director

Dr. Robert R. Gilruth, recently was presented the ASME Medal by The American Society of Mechanical Engineers at their Winter Annual Meeting held in New York.

Allen F. Rhodes, ASME President, cited Dr. Gilruth "for his distinguished service in aeronautical and space research and for his outstanding engineering leadership, by which he inspired and directed this nation's manned space flights and successful landings on the moon".

Dr. Gilruth, MSC Director heads the organization responsible for development of spacecraft for manned flight, for flight crew selection and training, and for the conduct of space flight missions. The lunar landings during 1969, as well as other manned space flights in NASA's Mercury, Gemini, and Apollo programs were to (Continued on page 3)

## Zero-G Inflight Demonstrations To Be Flown Aboard Apollo 14

Four zero-gravity inflight demonstrations will be flown on the Apollo 14 lunar-landing mission next month and may be shown in live television from the spacecraft on the return flight from the Moon.

They are technical demonstrations of equipment and processes designed to illustrate the use of the unique condition of zero-gravity in space.

The demonstrations result from the National Aeronautics and Space Administration studies conducted at their Marshall Space Flight Center, Huntsville, Ala., and the Lewis Research Center, Cleveland. They are simple tests that could provide information on zero-gravity effects useful in supporting the establishment of design requirements for future experiments in the materials science and manufacturing in the space program.

Each demonstration is stowed in the Apollo 14 command module. The units require only a small amount of power from the spacecraft for operation or lighting. Operation of the demonstrations essentially requires only activation of the tests by the astronauts. The tests are planned dur-

ing the relatively inactive return to Earth phase of the mission and are to be performed at the option of the crew. Data will be obtained by crew observations and photography during the mission and (Continued on page 4)

## Suggestions Win \$ For Hake, Reed

Jack Kinzler, Chairman of the MSC Suggestion Committee, recently presented awards to Fred W. Hake of the Technical Services Division and Lettie B. Reed of the Management Services Division.

Mrs. Reed suggested a method for standardizing distribution of MSC working papers. She was presented with a check for \$50.

Mr. Hake proposed that one organization be designated the central repair and control point for oscillograph galvanometers, electrically activated indicating devices used to record data. His suggestion, implemented in 1969, has thus far saved the government over \$29,000.

Mr. Hake's check for \$715 constituted the largest suggestion award granted here in two years.

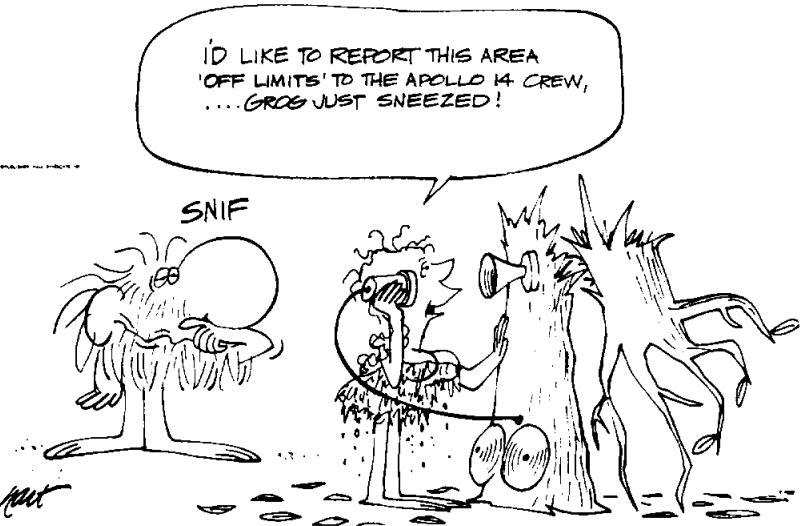
## Sportsmen Award Goes to Kraft

The Theodore Roosevelt Award was presented to Dr. Christopher C. Kraft, Deputy Director of MSC, by the National Collegiate Athletic Association (NCAA) at the Association's annual Honors Luncheon on January 12.

The award is presented annually to a "distinguished citizen of national reputation and outstanding accomplishment who—having earned a varsity athletic award in college—has by his continuing interest and concern for physical fitness and competitive sport and by the example of his own life exemplified most clearly and forcefully the ideals and purposes to which collegiate athletic programs and amateur sports competition are dedicated."

The award is the highest honor the NCAA can bestow. It is named after President Theodore Roosevelt because his concern for the conduct of intercollegiate athletics led to the formation of the NCAA in 1906.

Among former recipients of the award are President Dwight D. Eisenhower, former Senator Leverett Saltonstall, and Supreme Court Justice Byron White.

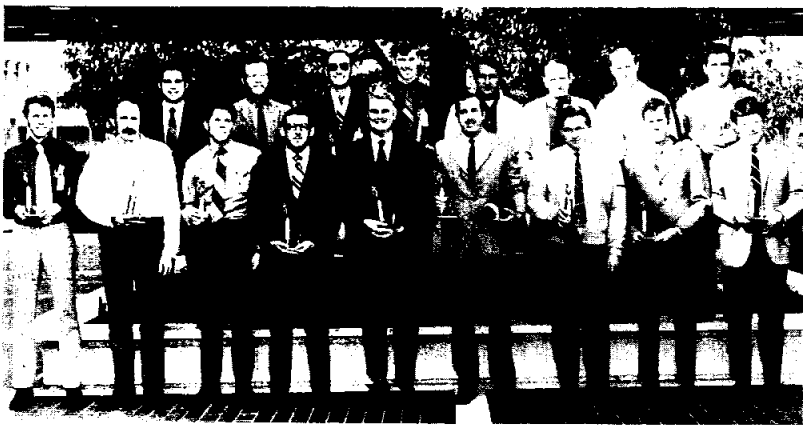


TELEPHONES ARE INSTALLED IN STRATEGIC LOCATIONS FOR YOUR CONVENIENCE

FLIGHT CREW HEALTH STABILIZATION PROGRAM

SYNDICATED CARTOONIST John Hart of Hall Syndicate has put together a series of six posters which call attention to the Apollo 14 Flight Crew Health Stabilization Program. The program which places emphasis on providing close medical surveillance of the Apollo 14 crew and those persons with whom they work closely is designed to minimize possible exposure of the crews to disease or illness. Only those persons on a 'primary' contact list will be permitted access to the crew during the 21-days prior to launch. Those on the list of 'primary' contacts which includes wives, backup crew members and mission essential personnel will receive physical examinations and be urged to report all illnesses occurring in their families during the pre-launch period.

## 1970 MSC Flag Football League Champions - F C S D



Back Row: Nat Hardee, Bud Henderson, Ron Huffman, Nate Leech, Rudi Rushing, Abe Hardy, Dave Worley, Bert Davila (Coach). Front Row: Paul Hendrickson, Ron Axford, Tim White, Jim Axley, Paul Folwell, Dick Hergert, Larry McWhorter, Bill Jackson, L. J. Corcoran. Absent: Terry Neal, Jim Derbonne, Richard Juday, Wayne Whittington, Mike Trichel.

### Tech Service Grad Viet Casualty

Michael K. Woodcock, 1969 graduate of the MSC Technical Institute, was killed December 13, 1970, by a land mine in Viet Nam during a rescue mission within a mine field. Mr. Woodcock's career began at MSC when he was selected to participate in the four-year apprentice training program beginning in September of 1965.

During this period he worked in the Technical Service Division shops and attended the University of Houston for his academic courses. Upon graduation he continued as an experimental machinist in the Instrument Machine Section of the Machine and Assembly Branch.

### Spanish Club Offers Course

The MSC Spanish Club is offering its second 14-week course in conversational Spanish. Classes will run from January 25 through April 28 and will be held on Mondays and Wednesdays in Building 13, Room 108 from 5:00 to 6:30 p.m.



Michael Woodcock

### Toastmasters Install Officers

Jack H. Cohen of the Reliability and Quality Assurance Office was recently installed as president of the MSC Toastmaster's Club. Alfred A. Menchacha of the Mission Planning and Analysis Division will serve as treasurer during 1971.

Anyone interested in joining the MSC Toastmaster's Club, which meets each Tuesday at 6:15 p.m., may call Jack Cohen at 483-3578 or Dick Hansen at 488-5510.

## Roundup Swap-Shop

(Deadline for Swap-Shop classified ad is Thursday of the week preceding Roundup publication date. Ads are limited to MSC civil service employees and assigned military personnel. Maximum length is 15 words, including name, office code and home telephone number. Send ads in writing to Roundup Editor, AP3)

### AUTOS

- 67 Sunbeam Tiger II, Ford 289/4BBL, Shelby manifold, Polyglas tires, xln cdtm, 22000 mi. \$2500. Zupp, 482-7156.
- 65 Chevrolet Bel-Air station wagon, auto trans, R&H, \$695. Hamner, 877-4093.
- 67 Mercedes-Benz, 230, 4-dr sedan, radio AM, FM, SW, auto trans, air, average retail price. Brooks, 591-2017.
- 51 Nash, 4-dr, radio, heater, good WSW, \$100. Sayers, 591-2395.
- 66 Ford F-100 1/2 ton pickup, SWB Styleside, 6 cyl, camper shell. Asking \$895. Kilpatrick, 591-2165.
- 70 Toronado Green, black vinyl top, A/C, AM-FM stereo, extras, plush car. Rainey, 474-2937 after 6 pm.
- 66 Olds Cutlass Supreme, 4-door, power, air, automatic trans. Merrell, 932-3046.
- 1965 Rambler 660 Classic, 4-door sedan, air, power, new motor and transmission, Excellent condition, \$575 Alford. HUB-3438.
- 63 Chevy II, excellent condition, 69 engine, extra, \$495 firm Van Bockel, HU2-7017.
- 65 Pontiac LeMans, 2-dr hardtop, red, 58,000 mi, air, new tires, original owner, \$850. Mosel, 488-3411.
- 69 Imperial, LeBaron, 2-dr hard top, vinyl roof, auto speed control, headlight dimmer and timer, AM-FM, stereo w/tape deck, air w/auto temperature control, tilting and telescoping steering wheel, 6-way seat, 19,000 mi, xln rubber, immaculate. Campagna, 591-2974.
- 66 Simca, 4-dr, radio, heater, runs good, 32 mpg, good economical transportation, \$395. Lindemuth, 482-1086.

### DID YOUR AD FAIL TO APPEAR HERE?

If you sent an ad to the ROUNDUP for publication and it did not appear in this column, it could be that you did not follow the directions above for submitting ads. Some editors may be clairvoyant, this one is not. Ads improperly submitted are consigned to file 13. EDITOR

- 70 Ambassador SST 4-dr sedan, low mileage, \$2585. Jacobsen, 487-0792.
- 68 Pontiac Tempest, 2-dr, auto, radio, air/heater, \$1375. Lang, 877-4171.
- 66 Malibu Convert, 4-on-floor manual shift, radio, A/C, 327 engine and peppy, good rubber, good cdtm, \$1000. Merrifield, 591-2437.
- 61 Sunbeam Alpine Convertible, 4-speed transmission, wire wheels, \$300. Hodges, 941-0169 after 6 pm.

### MISCELLANEOUS

- Bell helmets, 3, used, \$7.50 to \$20. Sizes 6 1/2 and 7 1/2. Joerns, 591-3330.
- Baby bassinet, xln cdtm, used very little, w/hood, pad, and skirt, \$10. Handley, 482-7041.
- 1970 outfit in good condition, 17-ft trihull, 120 hp outboard, accessories and trailer. Ready to operate. All for \$2295. Bland, 591-4580.
- Four Ford pickup truck hubcaps \$1.00 ea. Photo-electric relay and light source, \$10. Misc cabinet hinges and knobs, \$5. Child's snow sled \$5. Round picnic cooler \$2. Circa 1930 wooden airplane propeller \$50. Donnell, 877-1746.
- 1970 Suzuki TC-90 trail and street bike, less than 150 miles, turn signals, \$350. Donnell, 877-1746.
- Eico Mono FM tuner \$30. Eico stereo amplifier \$50. EV speaker and enclosure \$20. Zrubek, 591-2549.
- Beautiful dining room suite, six chairs, china cabinet, buffet, perfect. \$450. complete. Call 649-2569.
- Dynascope 6" clock-driven, equatorial mounted telescope. New \$250. Will sell for \$200. or trade for binocular microscope. Kosmo 481-3460.
- German Shepherd, 9-mo old male, registered, \$35. Merrell, 966-2612.
- 15' Lone Star aluminum boat, 25 Evinrude electric, Husky trailer, runs good. \$400. Gammon, GR1-2542.
- Rogers Black Diamond Drums, professional set includes snare, bass, bass tom-tom, floor tom-tom, 3 cymbals, complete set of cases and seat. Will negotiate price. Toole, 488-1825 after 5:30 pm.
- Purebred Basset male, no papers, black/brown, white, 19 mo., best offer cash or 12 ga. shotgun. Boykin, 946-5782.
- German Shepherd, AKC registered, 11 mo. old, all shots, obedience school, has been shown in fun shows, \$150. Kenyon 932-5925.
- Two Lahti speakers, walnut finish on enclosures, \$40. for the pair. Kenyon 932-5925.
- EICO 260 wideband oscilloscope w/high impedance probe. Like new \$80. Whittle, 932-5239.
- 61 Frigidaire auto washer, works OK but best for spare parts, \$15. Gurlay, 534-3800.
- Alvin Aero Club accepting members. T-craft \$5/hr., Yankee \$7/hr., Comanche 250 \$14/hr., wet prices. House, 482-7016.
- Clarinet Bb, Selmar soloist. Professional caliber instrument. Used two yrs by high school band student, xln cdtm, cost \$285, sale price \$200. Rubenstein, 877-3288.
- Kenmore gas dryer, xln cdtm. Bishop, 932-5161.
- Simmons (Beautyrest) queen-size bed, complete heavy-duty frame, 6 mo. old, xln cdtm, includes bedspread, \$190. Marent, 946-7028.
- Aquarium, 20-gal, includes light, backplate, stand, gravel, fish, filter, pump, etc., 4 mo. old. \$65. Brazil, 941-2487.
- Curtis Mathes 19" Color TV portable w/stand, xln cdtm, \$150. Thompson, 946-0522.
- Sauna bath heater, new, with controls. Campagna. 591-2974.
- Necchi Elna portable sewing machine w/all attachments. In good condition, \$25. Deans, 488-4009.
- Camping trailer, 16' or less. Condition not important. Mayhew, 591-5291.
- Pentax Spotmatic, fl.4 lens, black body. Thomas, HU1-2454.
- AKC Basset Puppies, sired by outstanding champion. Lacy, 488-6948.
- Victorian sofa, green damask upholstered, \$75. Baker, 986-5009.

Benelli Italian sports motorcycle 60 cc, matorador red, lights, horn. Looks and runs like new. Must sell, first \$75.00. Quachita aluminum lake boat, sea mist green, 10 ft, flat bottom, xln cdtm, \$35. Schwinn candy green Sting Ray, new tires, like new \$35.00. Horton, 877-4102.

Two Goodrich Radials, FR70-14, use as white or black sidewalls, used one month, \$30 ea. One Goodrich Nylon, 7.75-14, black, \$10. Vaughn, 488-2240.

Flute, arty, good condition with case, \$125 or best offer, Alford, HUB-2484.

Ski rig, complete 14' fiberglass Lone Star boat with 35 horse Super Seahorse motor and electric starter, Road King tilt trailer, fully equipped, many extras, all in perfect condition. \$650 gets it all. Alford HUB-3484.

Racing "Go Cart" extra Heavy Duty Dual Motor mounts, equipped with one 10 Horse West Bend Engine, Excellent condition, \$175. Alford HUB-3484.

NCR adding machine, one year old, \$100 or best cash offer. Boykin, x3171.

Spyder bike in good condition. 24-inch rear wheel. Hooper, 488-4120.

### WANTED

To contact others interested in mountaineering and technical rock climbing. Juday, 481-3946.

Used motor bike in good condition. Desired size: 150 cc. Hooper, 488-4120.

67 or 68 VW, good cdtm, low mileage. De-mont, 877-1754.

Roommate (female) to share apt at Villa Monterey, Gulf Freeway, \$70/mo. Brazil, 941-2487.

Information concerning collision with Green Cougar, bldg 30 parking lot, Dec. 17. Stoval, 471-1055.

19" Portable color TV, reasonable. Hamner, 877-4903.

Female roommate. Call Barbara 932-6622.

### RENTALS

Remote cabin, deep in Sam Houston National Forest, lease by day or week, ideal base camp for hunting or just getting away from it all. Leonard, 944-4997.

### REAL ESTATE

Equity for sale by owner, 3-1-1/2, screened patio, wooden fence, assume G1 loan, Bishop, 932-5161.

For sale or lease for one year, Spanish 4-2-2, furnished or unfurnished. Poindexter, 474-3930.

Tiki Island Lot: Choice Bay-front location on Jones Bay. Will consider second lien on assumption. \$2,000 below present market value. Mandell, 877-2925.

Two lots adjoining, 50x118 each w/trees, utilities available, League City. Bishop, 932-5161.

Mobile Home, 1970 DeSoto, carpet, central air/heat, Spanish decor. Walker, 483-2658.

Deer Park, 4-2-2 brick, \$250/mo. with option to buy, if desired. Blumentritt, 482-3970 or 479-4761.

## MSC Calls for Shuttle RCS Study

The NASA Manned Spacecraft Center has requested proposals from the aerospace industry for development of a computer program for a study of space Shuttle Reaction Control System (RCS) engines.

The study calls for a math program to evaluate design of an oxygen/hydrogen engine, RCS subsystems, and component parts. It will be conducted in three parts. They are (1) techniques for analysis, (2) development of a program model, and (3) development of the digital program.

MSC has allotted approximately \$100,000 for use in the study. Eleven companies have been invited to submit proposals.

The proposal calls for a fixed-price research and development contract, and it is to be completed approximately ten months after contract award.

The Shuttle is one of the key elements of the agency's manned space flight program. The vehicle could be flight operational as early as 1978.

## Solar Physics

(Continued from Page 1)

atory, Lockheed Solar Observatory, Aerospace Observatory, Kitt Peak National Observatory, and the High Altitude Observatory.

Dr. Frank Orrall of the University of Hawaii is the senior lecturer for the course. Dr. Orrall, who is on leave from the Department of Physics and Astronomy, will give a total of 38 hours of lectures on various topics in solar physics generally covering the entire field.

Other course lecturers are Dr. G. Richard White, senior scientist at the High Altitude Observatory (HAO), Boulder, Colo., Dr. R. Grant Athay, senior scientist HAO, Professor Adjoint in the Department of Physics and Astrophysics of Colorado, and Dr. John A. Eddy, senior scientist HAO, Professor in Astro-Geophysics Department of the University of Colorado.

The lectures are being video taped separately and will be available to other NASA personnel as well as principal investigators for the ATM experiments. Monthly update sessions will be held for the astronauts to review past solar activity, to discuss future trends, and review or obtain additional information on solar observation.

The course is divided into extensive reviews of the solar phenomena, the quiet sun (study of the solar interior, photosphere, chromosphere, and the corona), the active sun (sun spots, plages, prominences, active corona), and flares and explosive phenomena.

As part of the course, students study the sun in real time by means of closed circuit television. The TV picture is piped in from MSC's solar telescope, located about a half mile from the classroom.



Astronaut Alan Shepard, Apollo 14 commander, discusses final plans for the MSC Safety Program with James E. Powell, Chief, Industrial Safety Office. Shepard will sponsor this year's campaign—which goes by the exotic title of ZERO IN.

# ZERO IN on Safety, Zero out Accidents

By Doug Campbell and Sherman Kendall  
Safety Office

The lid is off the "ZERO IN" campaign.

The lid is on accidents.

In an announcement to all employees, Dr. Robert R. Gilruth, Center Director, has asked for individual cooperation in a major effort to make the Manned Spacecraft Center a safer place to work. He emphasized that no objective of this organization is more important than achieving the goal of ZERO injury performance.

Dr. Gilruth has asked Astronaut Alan Shepard to act as sponsor for the ZERO IN program. Al has worked closely with the Safety Office in planning this year's activities. Before he left for the Cape where he will command Apollo 14, Shepard said, "I am happy to sponsor the ZERO IN on Safety program at MSC."

ZERO IN is a program designed to give all a safer place to work.

When President Nixon announced the ZERO IN on Federal Safety program, he made it clear that the aim of this two-year campaign is, "to reduce the number of injuries and other losses occurring in Federal work places."

By his inauguration of this new program, Mr. Nixon continues a policy of presidential sponsorship of government-wide safety campaigns. Mission Safety-70, which ended December 31, can be credited with averting over 22,000 disabling injuries since 1964. However, the record of 43,000 such injuries sustained last year shows a need for renewed effort.

Mission Safety-70 proved that a broad approach to safety can be effective. ZERO IN will use a more specific approach to reducing the accident rate by identifying and removing the causes which

produce the greatest share of injuries.

Shepard and the Safety Office have planned a wide-range of continuing safety activities. There will be awards for organizations, for effective supervisors, and for individuals. Safety films covering a wide variety of activities will be shown at various locations. An "Astronaut of the Month" will be featured on decals which will also give the safety theme for the month. There will be posters, leaflets and other promotional materials.

For supervisors there will be monthly safety kits which will assist them in conducting an effective ZERO IN program, and safety meetings will be held at all levels of management.

## Gilruth Award

(Continued from Page 1)

a great degree conceived and personally directed by Mr. Gilruth.

He entered on this career in 1935 when he went to NASA's Langley Laboratory after getting his B.S. and M.S. in Aero Engineering from Minnesota. In his subsequent work he developed the pilotless aircraft research division and later directed hypersonic dynamic research. In 1958 he was assigned to manage Project Mercury and in 1961 he became director of MSC.

\* \* \*

Earlier (in December) he was elected to an Honorary Fellowship in the Royal Aeronautical Society; London, England. The award was made at the Fifty-Eighth Wilbur and Orville Wright Memorial Lecture, billed as one of the most distinguished aeronautics event in Great Britain.

### U.S. SPONSORED

## Earth Resources Workshops Set for May

The prospects of using satellites as well as aircraft to survey Earth resources and an almost infinite variety of Earth surface features will be the subject of an international workshop sponsored by the United States government at the University of Michigan, May 3-14, 1971.

The International Workshop on Earth Resources Survey Systems will provide foreign experts with information on the latest techniques which are being used to interpret data acquired by aircraft and spacecraft. The workshop will also provide a basis for informed consideration by administrative officials who may want to consider authorization of survey programs in their own countries.

In a letter to United Nations Secretary General U. Thant, U.S. Ambassador to the UN Charles Yost, extended invitations to the

workshop to administrators and experts from UN member states, the UN itself and its specialized agencies, and the International Atomic Energy Agency.

The invitation was made in accordance with President Nixon's statement before the UN General Assembly Sept. 18, 1969, in which he said that the U.S. Earth Resources Survey Program will be dedicated to producing information not only for the U.S., but also for the world community. Subsequently, on Sept. 1, 1970, at a meeting of the UN Committee on the Peaceful Uses of Outer Space the U.S. Representative to the United Nations announced that the U. S. would hold an International Workshop on Earth Resources Survey Systems.

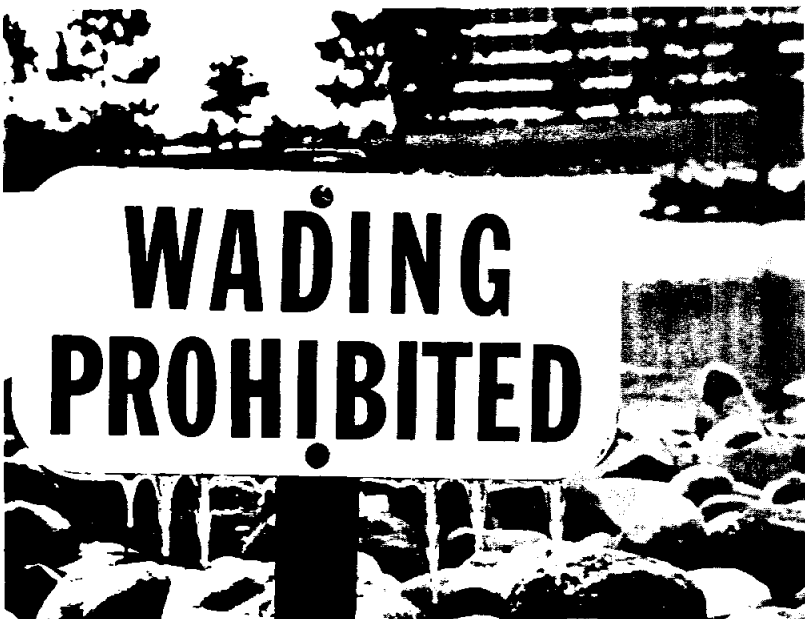
The workshop will survey the type, quantity and quality of data already acquired and expected to

become available to resource managers. Subjects to be covered will include methods of collecting, processing and analyzing Earth resources data. Potential courses of action for countries considering the initiation of Earth resources programs will be discussed, as well as the approximate costs involved and opportunities for international cooperation and assistance.

During its first week, the workshop will include a general review of the U.S. Earth Resources Survey Program and will address administrative and budgetary questions of interest to senior government officials. Presentations will be made also on the Brazilian and Mexican Earth resources programs which are carried out in cooperation with the National Aeronautics and Space Administration. Participants will have opportunities to visit aircraft equipped for remote sensing.

Week number two will be devoted to working sessions on data acquisition, analysis and application in such areas as agriculture, rangeland, forestry, geology, hydrology, geography, cartography, oceanography and environmental pollution.

The workshop is sponsored by NASA, the Departments of Agriculture, Commerce (National Oceanic and Atmospheric Administration), Interior (U. S. Geological Survey) and State, and by the Agency for International Development and the Naval Oceanographic office.



Even the ducks weren't wading this cold January day, according to Thomas J. Linbeck of Mission Planning and Analysis Division. The temperature dropped to the 20's with rain and sleet, but Jupiter Pluvius smiled and said, "Go back North you icy winds." They fled.

## ZERO IN



A 30 year Award Certificate was presented to Gilbert W. Griffey by J. A. Davison, Chief, Quality Assurance Office, MSC-Downey. Mr. Griffey is Chief of the Assembly and Test Operations Section at Downey.

## SHUTTLE VERSATILITY

## Study Shows Many Potential Uses

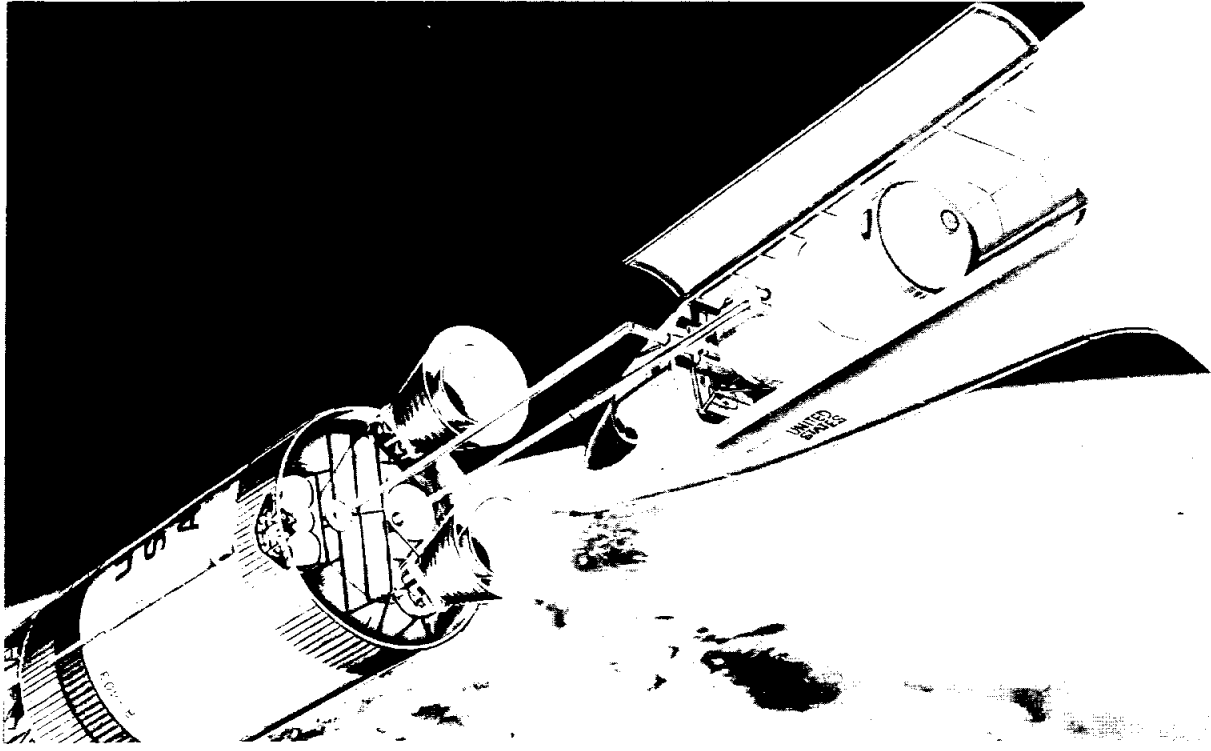
The space Shuttle is to be designed as a low cost vehicle which will transport cargo, crew, passengers and experiments into near-Earth. The two stage vehicle is capable of carrying approximately 25,000 pounds. It will be launched vertically with the stages returning to Earth and landing horizontally.

Cost reduction will be achieved through less expensive ground operations, low cost expendables, minimum refurbishment, and multi-purpose uses.

The multi-purpose uses of the Shuttle have come under intensive study by personnel assigned to the Flight Operations Directorate at MSC. To date they have identi-

fied five representative missions which are clearly within the capability of the space plane.

These are: 1) Placement and resupply of a space station; 2) satellite placement and supply; 3) Satellite recovery; 4) a 30-day scientific mission; and 5) Geosynchronous orbit (19,322 nm) satellite placement.



**SHUTTLE VERSATILITY** — This drawing depicts one of many uses of the space shuttle; a concept of a Chemical Propulsion Stage (CPS) being refueled by the Earth orbiting shuttle. The CPS could possibly have propellants added by rendezvousing with tanker vehicles. Refueling methods for transfer of cryogenic propellants require much study before a final decision can be made on the approach to be used but they hold promise. In this mode, the space shuttle's forward firing attitude control jets could provide a low level acceleration field. The transfer would be accomplished by pressurizing the tanker and injecting the propellants through spray nozzles to collapse the ullage in the receiving vehicle.

## Apollo 14 to Have Zero-G Demonstrations

(Continued from Page 1)

laboratory tests following the mission.

The four technical demonstrations planned for Apollo 14 are:

**Electrophoretic Separation** — Most organic molecules pick up small electric charges when they are placed in slightly acid or alkaline water solution and will move through such a solution if an electric field is applied to it; this effect is known as electrophoresis. Since different molecules move at different speeds, the faster molecules in a mixture that starts moving from one end of a tube of solution will outrun the slower ones as they move toward the other end.

This characteristic of electrophoresis can be exploited to prepare pure samples of organic materials for applications in medicine and biological research if problems due to sample sedimentation and sample mixing by convection can be overcome.

The electrophoretic separation demonstration is designed to test an engineering approach to performing the separation process in space, where the weightlessness of the solutions and sample mixtures should suppress both convection and sedimentation. A small, specially-designed electrophoretic separation apparatus will be tested and the quality of the separations

obtained will be demonstrated by trials with three sample mixtures having widely different molecular weights: (1) a mixture of red and blue organic dyes; (2) human hemoglobin; and (3) DNA (the molecules that carry the genetic code) from salmon sperm.

If successful, the demonstration will show that more refined apparatus could be developed to prepare samples of materials on future space missions for use in medical and biological research on the ground. Ultimately, the method may prove practical for large-scale processing of new vaccines and similar biological preparations on board manned space stations.

**Heat Flow and Convection** — This demonstration is designed to perform four tests on heat transfer in weightless liquids and gases. In three of the tests, temperatures around electric heaters immersed in samples of pure water, a sugar solution, and carbon dioxide gas will be mapped out by color changes produced in "liquid crystal" temperature indicators. The fourth test will observe the fluid flow induced by heating a sample of oil containing a suspension of fine aluminum flakes.

The results observed and photographed by the astronauts will characterize the effects of convection and other modes of heat transfer in fluids during space

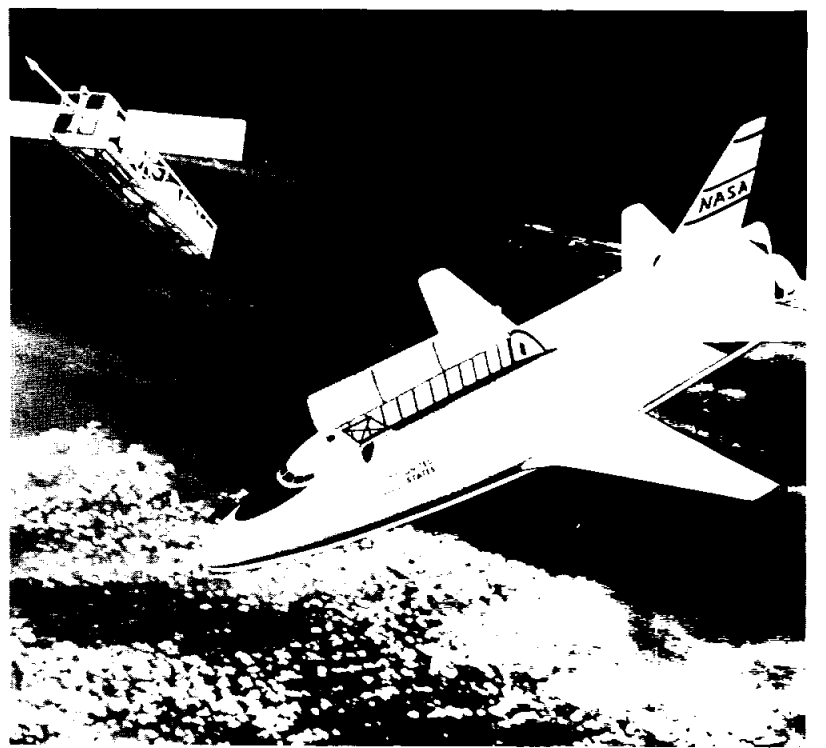
flight. This information will be of value in designing future space experiments and assessing the feasibility of many processes that have been proposed for manufacturing products in space.

**Liquid Transfer**—This technical demonstration is designed to show the benefits of using tank baffling in the storage and transfer of liquids in zero-gravity. The tests will be conducted with two sets of simulated tanks, one set containing tank baffling and the other without any baffling. By observing and photographing the transfer of liquids in the two sets of tanks, a comparison can be made to determine the benefits obtained from the use of baffles in zero-gravity.

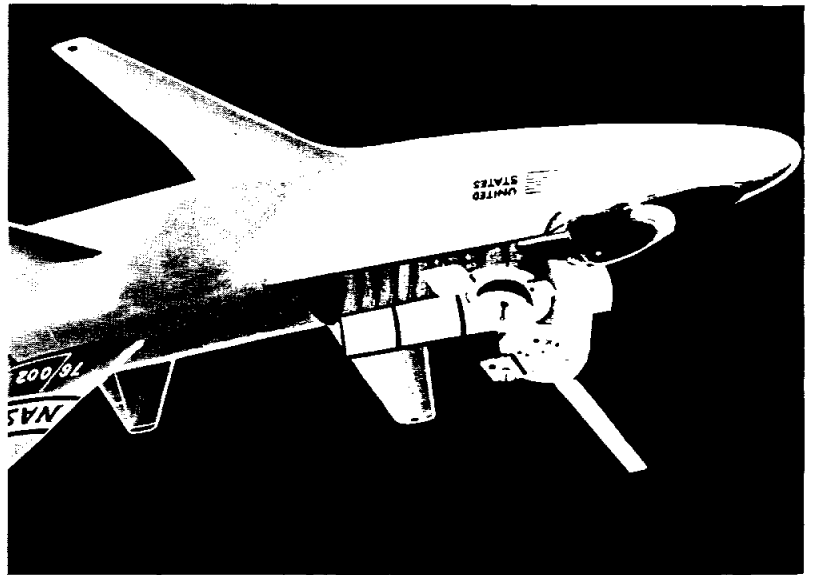
The advantages of tanks with baffles can be important in the design of future space refueling systems.

**Composite Casting**—This technical demonstration is designed to demonstrate the effect of zero-gravity on the preparation of cast metals, fibre-strengthened materials, and single crystals. These test specimens will be processed in a small heating chamber in flight, for examination and testing upon return to Earth.

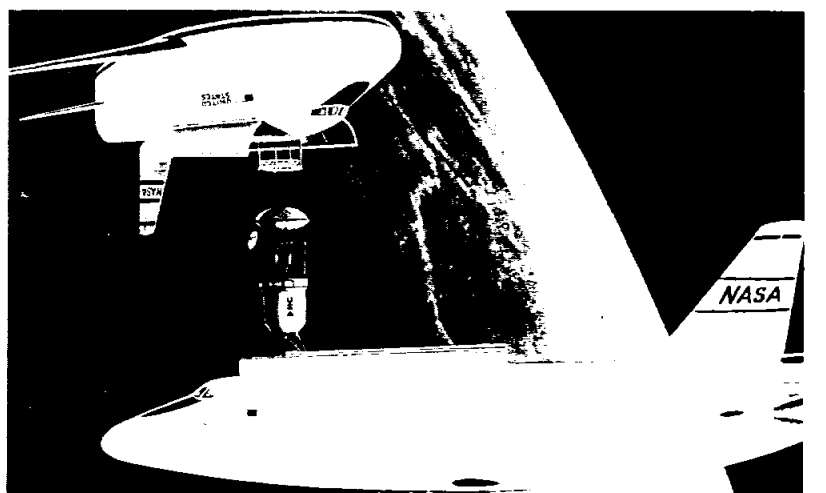
The results to be obtained from these tests will be used to evaluate the prospects for making improved metallurgical products in space.



**SHUTTLE VERSATILITY**—Concept of a Shuttle deploying a High Energy Astronomical Observatory in Earth orbit. This satellite is actually planned for launch in 1974. It is programmed for a 200 nautical mile circular orbit inclined 28.5 degrees to the Equator. It is expected to weigh about 23,000 pounds and measure 40 feet long. Because of the generous payload carrying capability of the Shuttle, it is possible that later astronomical observatory systems could be launched at substantially lower costs. The relatively inexpensive flight cost of the Shuttle allows for necessary repair, refurbishment and reuse.



**SHUTTLE VERSATILITY** — The Orbiter portion might stay in Earth orbit for periods up to 30 days while an attached resources module surveys crops, forests, minerals and the movement of marine life. No, the picture isn't upside down. Sensors on the survey module must point Earthward to be effective.



**SHUTTLE VERSATILITY**—For missions which require a larger payload velocity capability than can be achieved by a single Shuttle, two vehicles may rendezvous and the propulsion stage carried by the first would be docked with the payload carried by the second. The payload illustrated in this artist concept is the Viking, a Mars mission vehicle. The stage might be a large tank Agena-type vehicle.

## Grace Winn—

(Continued from Page 1)

homes, churches, and community activities. She helped ease the difficulties of relocation for more than 2,000 families moving to Houston.

Mrs. Winn was active in many civic affairs. She was a member of the Board of Directors for both the National Leukemia Society and the Houston Chapter of the

Leukemia Society.

She was a former vice-president of the Houston Civic Music Association. She was also a member of the Board of Directors for the Community Health and Welfare Civic Association and the Houston Public Library Board.

At the time of her death, Mrs. Winn represented NASA on the Cultural Affairs Committee.