

Young and Duke to Become First Moon-Based Astronomers

When astronauts John Young and Charles Duke land on the moon, they will carry with them an instrument which may help answer one of the fundamental riddles of the universe.

The device is known as the far-ultraviolet camera/spectrograph, or more familiarly as the "UV

camera," and scientists hope it will help explain why clusters of galaxies appear to have 30 times more mass than the sum of all galaxies we can detect in each cluster with earth-based telescopes.

This is the so-called "mass discrepancy" which has led scientists

to suspect that most of the matter of the universe is not locked up within the stars, but rather in the form of gas—mainly hydrogen—located in what has popularly been referred to as the "void of space."

The UV camera will be the first astronomical telescope to be operated on the moon.

It will be used to detect clouds of hydrogen and other gases around the Earth and sun, between the stars of the Milky Way, in other galaxies and possibly between galaxies in distant clusters.

In particular, scientists hope to get a complete picture of the geocorona—a tenuous cloud of

atomic hydrogen extending 40,000 miles or more around the Earth.

The cloud is known to exist, but measurements from inside it leave its shape and size uncertain. The outside view from the Moon should show just how hydrogen is distributed, probably with a

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

March 24, 1972

Fellow Members of the Apollo Team:

I have received the following letter from President Nixon in which he said he wanted the Apollo Team to know how much this nation values the work we have done and are doing in the Apollo Program. The letter was addressed to me but the President's words were really addressed to each of you.

I am pleased to pass along the President's words which each of you has done so much to earn.

Sincerely,

Rocco A. Petrone
Rocco A. Petrone
Apollo Program Director

THE WHITE HOUSE
WASHINGTON

March 21, 1972

Dear Dr. Petrone:

As we approach the final countdown for Apollo 16, I want you and all the men and women of Apollo to know how much this nation values your splendid efforts. The moon flight program has captured the imagination of our times as has no other human endeavor. You and your team have, in fact, written the first chapter in the history of man's exploration of space, and all future achievements must credit all of you for having blazed the path.

Countless people throughout the world will soon be sharing with you the excitement of Apollo 16's voyage, and I know I speak for all of them in conveying to you my warmest best wishes for a safe and successful flight. Good luck!

Sincerely,

Richard Nixon

Dr. Rocco A. Petrone
Director, Apollo Program
Office of Manned Space Flight
National Aeronautics and
Space Administration
Washington, D. C. 20546

ROUNDUP

NASA MANNED SPACECRAFT CENTER

HOUSTON, TEXAS



Vol. 11 No. 10

March 31, 1972

MSC Picnic Theme Worth \$25 Cash

A theme for the September 23 MSC picnic is worth \$25. If you come up with the winning suggestion, that is.

Contest rules:

1. Deadline is end of regular work day April 14.
2. Each entry must be submitted in sealed envelope to Jim Rayl, PA2.
3. All entries will be date

(Continued On Page 4)

AFGE Officers Nomination Called

Nominations for 1972-73 officers of Local 2248, American Federation of Government Employees, are scheduled for the meeting of April 13.

Any member in good standing is eligible for nomination. Election of officers will be May 11.

The nomination meeting will be convened at 5 p.m. in the Bldg. 30 auditorium.



Computer and Illustrator Team Up For Fast-Draw Views of the Moon

An artistic computer? There's one in Graphics Section of Center Operations Support Services Directorate.

Not only does the electronic Rembrandt assure accuracy in illustrations of the lunar surface, it also gives the human artist more time for creativity.

The technique is demonstrated in the photograph above. That's Graphics Section Head Boyd Mounce standing and STC Illustrator Jerry Elmore seated at the tracing table.

They are tracing surface contours from a three-dimensional contour map of the Apollo 16 landing site.

The movements of the tracing arm are fed through the computer which translates them to the desired viewpoint on the two-dimensional plotting board in front of the men.

Shading the contour lines according to their position with re-

spect to the sun gives an accurate drawing like the one in the upper right corner of the plotting board.

Examples of the computer-drawn lunar views can be found in Dr. Gene Simmon's just-published book "On the Moon with Apollo 16."

Kraft, Lovell Set For TV 'Advocates'

MSC Director Chris Kraft and former astronaut Jim Lovell, now deputy director of Science and Applications, will appear as "witnesses" on the TV show "The Advocates" in which the Space Shuttle program will be debated.

The program presently is scheduled to be shown here at 7:30 p.m. Tuesday April 13 on KUHT-TV, Channel 8. Viewers are urged to write in their opinions for or against the issue discussed.



DOCKING DISCUSSION — Aerospace engineers from the Soviet Academy of Sciences met with MSC personnel here this week in another of the series of working group conferences on compatible rendezvous and docking systems. Recommendations of this and similar working groups will be used by the full U.S. and Soviet delegations in arriving at a final design for a joint rendezvous and docking in space. The Russian engineers, across the table, are V. I. Bagno, B. S. Chizhikov, Y. G. Bobrov, and V. S. Syromyatnikov, head of the group. The U.S. group is headed by D. C. Wade, seated, assistant chief of the Structures and Mechanics Division of E&D.



NEBA Contacts Eligible Employees on Insurance

This is the third and final installment in the story of insurance programs available to MSC personnel through the NASA Employees Benefit Association.

* * *

Eligible employees not now participating in the NEBA group life insurance plan have been sent a brochure and a letter urging them to complete the enrollment application and return it to the Personnel Division.

After acceptance in the plan and payment of the first quarter's premium, each participant will be sent a premium due notice about ten days before the beginning of a new quarter.

Quarters are January through March, April-June, July-September, and October through December. The plan allows a 20-day grace period from the due date.

While the policy actually provides coverage for a 31-day period of grace for payment by NEBA to the insurance company, the other 11 days are needed for book-keeping and consolidation at NASA headquarters of payments from all chapters.

The premium is established each year by the insurance company and is based on factors such as the average age of the participants and the claims experience of the plan.

The NEBA Board of Governors has built up a reserve fund to maintain stability of the plan. NEBA subsidizes the difference between premiums actually collected and those paid to the company, thus keeping the premium rate stable.

As pointed out in an earlier article, the original rate for life insurance without double indemnity benefits was \$2.40 per thousand per quarter.

That rate was reduced until it reached a low premium of \$1.10 a quarter with accident benefits added.

In mid-1966 it became necessary to increase the rate to \$1.30 per quarter. The rate has stayed constant at that figure, and local chapter officers expect it to do so through the 1972-73 insurance year.

For the quarter just ending, the MSC chapter has an enrollment of 2066 employees with 1241 of them carrying dependent coverage.

Employee insurance in force for the quarter at MSC is almost \$47.2 million.

BRIEFED AT MSC

Apollo 16 Crew Plus Brad Perry Set For Launch; Brad Will Fly Own Craft

John Young, Ken Mattingly, Charley Duke and Brad Perry are ready to fly the mission of Apollo 16.

But Brad won't be going with the other three—he has his own command module.

Brad is the youngster from Albemarle, North Carolina, who built and equipped his own spacecraft (November 19, 1971,

Roundup) but then did not get to "fly" the Apollo 15 mission because he found himself suddenly famous.

Now, thanks to people like Bob Ernull, Brad has been briefed on the 16 mission by the people who planned it, has gone through a bit of the same training given the crew, and has had the opportunity to compare NASA's spacecraft simulators and mockups with his own.

Ernull, technical assistant for Skylab in the Flight Operations director's office, met Brad two and a half years ago in Albemarle. He and other MSC personnel helped the boy's project along with technical advice and documentation.

When interviewers and well-wishers kept Brad away from much of the Apollo 15 flight, the youngster set his sights on the flight to Descartes.

With the experience he got during his two-day-plus visit here earlier this month, he should be well prepared.



BRAD BRIEFED — Young Brad Perry's plans to simulate the entire Apollo 16 mission — Spending the duration of the actual flight in the mockup command module he built — get a helping hand from MSC personnel and equipment, among them Terry Watson and Bill Moon at the Apollo CSM crew station trainer. Moon, prime environmental/electrical/communications officer for the upcoming mission, points out various control panel features. Then he and Watson, prime guidance/navigation/control officer for 16, go over the flight plan with Brad. The simulator is used mostly to familiarize flight controllers with control panel displays and procedures, but occasionally it is used by flight crews as well.

Workshop Slated On Finding Jobs

With the help of local technical societies, the American Institute of Aeronautics and Astronautics will conduct a three-part workshop for professional employment in the Clear Lake area in May.

The sessions are designed to aid technical and professional personnel now unemployed, or expecting to be, to find new jobs. Reservations for the free workshop, currently planned for the first three Thursdays in May, can be made through J. W. Straayer, 1427 Kingstree Lane, Houston 77058.



SUGGESTION AWARD — David R. Forward, right, of the Resident Apollo Spacecraft Program Office in Downey, California, earned \$165 for his suggestion concerning spacecraft water-glycol pump accumulators. His check and certificate are presented by Downey RASPO Manager Ford L. Miller.

Orbiter System Study Requested

A request for proposals to study and then design a hypergolic bipropellant system for the Space Shuttle orbiter reaction control system (RCS) has been issued.

RCS systems for the Phase B Shuttle baseline used combinations of oxygen and hydrogen as primary propellants.

With present space transportation configurations, the need for systems which can be developed at lower costs and weight becomes more important.

A current candidate is the hypergolic bipropellant system using a fuel and oxidizer which ignite

spontaneously upon contact.

One of the objectives, in addition to the study, is to provide suitable engine hardware for test and evaluation.

'Challenge' Topic of Joint Program

The Current Challenge to Technology is the subject of the combined SAMPE and AIAA program Tuesday, April 11, at the NASA Holiday Inn.

The speaker: Dr. Arthur Kantrowitz, vice president and director of Avco Corp.

Reservations: by 5 p.m. April 7 through Ruth Karpf or Jeanette Frazier, ext. 4407.

ROUNDUP

NASA MANNED SPACECRAFT CENTER

HOUSTON, TEXAS



The **Roundup** is an official publication of the National Aeronautics and Space Administration Manned Spacecraft Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for MSC employees.

Photographer: A. "Pat" Patnesky

Young

(Continued From Page 1)

sharp, compressed edge on the sunward side, and fuzzy tail down-sun.

The UV camera gets its name from the fact that it detects gases such as hydrogen by the way in which they emit, scatter and absorb ultraviolet light. Telescopes on earth tend to have their view of inter-stellar hydrogen clouds obscured by earth's atmosphere and by our planet's own geocorona.

From the airless surface of the moon it will be possible, for the first time to see the entire geocorona of earth; and at the same time to detect and perhaps measure the amount of free hydrogen in the universe.

The UV camera experiment is based on proposals from Dr. George R. Carruthers of the Naval Research Laboratory in Washington, D.C., and from Dr. Thornton Page working at the Manned Spacecraft Center while on leave from Wesleyan University.

Dr. Carruthers is Principal Investigator for the UV camera experiment and was responsible for the design and development of the instrument. Dr. Page is a co-investigator for the experiment.

The UV camera can be pointed at any selected object in the lunar sky by twisting the upper part to the correct azimuth—the angle around the horizon—and by tilting the camera to the correct elevation—the angle above the horizontal.

During the three EVAs at the Descartes site, Young plans to make eleven such pointings.

When he presses a lever, the UV camera starts an automated sequence of exposures: six direct photos of one-to-thirty-minute exposure and eight spectra with exposure times ranging from three minutes to two hundred minutes.

All the images—photos and spectra—will be formed on special

Jimmy Warren Memorial Bowling League

Ball Busters	66½	37½
Hertz	59	45
Spoilers	57	47
Hexes	56	48
Alley Oops	55½	48½
Fabricators	54½	49½
Chokers	53½	50½
Bit Pickers	53½	50½
Team 14	53	51
Pin Pounders	52	52
Mixers	50½	53½
Achievers	43	61
Splitters	40	64
Leftovers	34	70

Hi team set to date: Fabricators 3189

Hi team game to date: Fabricators 1120

Hi individual game to date: Loe, Spoilers 272; Wilson, Hertz 272; Grogan, Busters 272;

Hi individual set to date: Loe, Spoilers 754.

Individual scratch hi, Mar 23 session: Bruce, Hexes 233/623; Jevan, Pounders 223/608; Bordano, Busters 213/595; Cooper, Mixers 209/594; Council, Achievers 209/594.

35mm photographic film which the astronauts will return to Earth for processing at MSC. The images will range from "under-exposed" to "over-exposed," so that both bright and faint features will be measurable.

The light recorded is invisible UV between wavelengths 1050 and 1550 angstroms in the direct photos (through two different filters), and between 500 and 1550 angstroms in the spectra.

Each of the photos will record the far-UV light from several dozen nearby stars, some star clusters, and many distant galaxies, including a total of 10 quasars (exploding galaxies).

Between the galaxies in six distant clusters scientists may find evidence of intergalactic hydrogen composing up to 90 percent of the universe.

(Deadline for Swap-Shop classified ads is Thursday of the week preceding Roundup publication date. Ads are limited to MSC civil service employees and assigned military personnel. Maximum length is 20 words, including name, office code and home telephone number. Send ads, typed or legibly written, to Roundup Editor, AP3)

Roundup Swap-Shop

MISCELLANEOUS

Membership to Sunmeadow Golf Club, \$300. 483-5305.
 24-hr electric wall clock, illuminated, \$10.
 Drake 1-A amateur receiver, perfect, \$95.
 Brand new Heath SB-102 transceiver, \$400.
 Lindsey, 488-0517.
 Omega antenna noise bridge, mint cndn, \$20. Lindsey, 488-0517.
 Trailer hitch, fits 68-72 Ford sta wgn, heavy duty 250 lb tongue wt. \$15. Lousma, 482-2360.
 Rebuilt fan motor for Fedders 3 or 3½ ton air conditioners, \$25. Silver, 488-6540.
 Sears 2-cycle lawn-mower, 2.5hp 20-in cut, 25. Brandenberger, 482-7883.
 1876 Colt dbl-actn revolver, .41 Long Colt, \$100. Morton, 946-4752.
 Remington Rand 10-key adding machine w/paper tape printer, \$40. 649-2569.
 4 wheel rims and hub caps for standard size Dodge, singly, pairs or set. Rainey, 488-4384.
 Colored crushed glass, many colors and sizes, 25¢ a pound. Wood, 333-2373.
 Two 6 x 14 Keystone mag wheels, gd cndn, cost new \$75, sell for \$50. Williams, 488-2432.
 Royal manual typewriter \$15, typing table \$9, Thayer Coggin leather arm chair \$20, antiq eclassroom desk 20. Harvey, 621-5311.
 White Kings and other squab raising pigeons. see at 4203 Highway 146. Bacliff.
 Twin-blade electric lawn mower, \$10. Dunn, 472-7478.

SWAP SHOPPERS: We have been getting ads that we cannot run, mostly because they don't contain information we must have—your name, MSC office code, and your office extension so we can check with you on any questions we might have about your ad. And many of you have a long wait for your ad to appear because you miss the deadline for submitting it—5 p.m. THURSDAY of the week before publication. For instance, the next issue is April 14; the Swap Shop deadline is 5 p.m. Thursday, April 6.

RECORDING & STEREO

X-200D Akai 7" reel-to-reel tape deck, xint cndn, 5 mo old, \$200. Also #150 Scotch 7" reel tapes, never out of pkg, \$1.75 ea. Merrell, 966-2612 after 5.
 RCA solid state tape recorder, counter, 3 spd, \$75. Brandenberger, 482-7883.
HOUSEHOLD ARTICLES
 Baby crib, white, \$15. Carbed SS, car seat \$5. Gibbons, 485-1661.
 Free 9 x 12 black and white straw carpet. Law, 944-7596.
 Executive secretary desk, walnut, 34 x 60, rt-hand typewrtr lift, \$125. Lindquist, 332-4282.
 Dinette, 6 chairs, leaf, color brown and white, \$70. Beckham, 946-5408.
 Magnavox b&w TV w/stand, gd working cndn, \$40. 20-gal aquarium, fish, pump, filter, light etc. incl black wrought iron stand, \$40. Lohman, 487-4233.
 Leather reclining chair, \$35. Large coffee

VEHICLES

70 Opel sta wgn w/air, radio, 4-spd trans, 25mpg, 32,000 mi, \$1450. Erickson, 488-1901.
 67 Dodge Dart, radio, air, gd work car, runs gd/looks rough, \$75. Palmer, 334-2918.
 70 Suzuki TC 90 motorcycle, low mileage, xint cndn, many xtras, \$300. Rose, 334-3461.
 71 Norton, show quality, fully customized, springer forks, x-bars, raker, under 2000 mi, \$2900 invested, sell for best offer. Broussard, 333-2542.
 69 Mustang Mach 1, 390 engine, auto, air, pwr steering pwr disc brakes, low mi, xint cndn. Hood, 946-8804.
 Cassna 170A, new annual, 160 hrs on factory rblt engine, new interior, VHT-3 radio, xint cndn, \$4995. Lohman, 487-4233.
 65 Fury II 9-psngr wgn, pwr, air, FM, new battery, tires/frnt end gd shape, \$475. Kranz, 534-4125.
 67 Pontiac GTO, air, pwr steering, pwr brakes, 4-spd, new tires, one owner, make offer. Robinson, 944-3243.
 65 Ford window van 8-psngr, 6 cyl, gd tires, new battery, xint cndn, \$775. Hawk, 482-7526.
 Boys 26" English 3-spd bike, xint cndn, \$35. Vittono, 488-2206 after 5.
 70½ Kawasaki Mach III 500cc, pfct cndn, 2700 mi, xtras, \$750. Goodwin, 623-8368.
 58 Chevrolet, good transportation, Siegfried, 334-2848 after 4:30.
 62 Rambler Classic sta wgn, air, radio, auto, \$150. Shelton, 332-2091.
 70 Honda CL 70, low mi, xint cndn, \$250. Clowdis, 471-2447.
 Girls 20" Sears bike, balloon tires, gd cndn, w/training whls, \$18. Rosenberg, 333-3866.
 70½ Honda CL 450, 7000 mi, new chain, xint cndn, red, \$750. Ardoin, 538-1500.
 68 Cadillac coupe to settle estate \$2250, \$300 under NADA retail. Ward, 333-2182.
 4hp Cat mini-bike, 3 mo old, xint cndn, \$140. Garza, 472-5243.
 66 Pontiac Bonneville 4-dr hdt, two-tone, air, power, gd cndn, Brazil, 422-5936 (Baytown) after 5:30 & weekends.
 70 Yamaha 360 RT1 Enduro, expansion chamber, buddy seat, gd cndn, \$525. Dusenbury, 334-2276.
 70 VW Bug, sun roof, 15,000 mi, bal of warranty, xint, \$1500. Musgrove, 488-3966.
 62 Pontiac Bonneville hdt cpe, radio, air, new transmission & tires, \$375. North, 482-7726.
 66 Ford sta wgn 8-pass, a/t, pwr steering/brakes, air, 390 V-8, new tires, bargain, \$825. Humber, 944-8753.
 71 Suzuki, brand new, \$100 and take over payments. Luna, 485-3533 after 5:30.
 71 Chevrolet Camaro, bucket seats, air, pwr steer, rally whl covers, wide oval tires, Int cndn, \$2900. Remington, 331-3719.
 67 Ford Galaxie 500, excessive mi, no air, gd interior & tires, mech sound, xint work car, \$575. Remington, 331-3719.
 68 Volkswagen camper bus, gd cndn, mot-

or completely rebuilt and guaranteed 4000 mi more. \$1600. Sayers, 333-4378.

PETS

Free dachshund-beagle, male, 3 mos, also adult female dachshund-poodle. Boykin, 334-1276.
 Snowwhite shepherd puppies, AKC, 7 wks, makes only, wormed. Abel, 946-8245.
 Quarter horse, 6 yrs, sorrel gelding, blazed face, wormed, very gentle, \$275. Cox, 481-3605.
 Free male beagle, AKC, 2 yrs, good family. Wade, 334-2751.

WANTED

Used 16mm sound projector. Jaax, 488-1116 after 5.

BOATS

21' Southcoast sailboat w/working sails and 5hp obm. \$2000. Hill, 332-3838.
 Blue Sunfish sailboat and trailer, gd cndn, 450. 488-0266.
 80hp Johnson Super-Seahorse, electric, w/controls, spare prop and tach, \$575. Myers, 481-0037.
 Sunfish sailboat w/trailer, xint cndn, \$350. Schmitt, 534-5207.
 21' Thunderbird Formula 155hp OMC I/O, cabin-vee bunks, head, new 4-whl sportsman trailer w/surge brakes, \$3600. Roosa, 877-2867.
 Luxurious 16' speedboat, 120 hp ob, trailer & equip incl pro ski-tow bar, 71 model, mint cndn, \$3595. 333-4580.
 71 tri-hull 17' fishing/ski boat w/canopy, controls & equip, 70 120hp obm, trailer, exInt cndn, \$2495. Bland, 333-4580.
 Gulf Coast 22 sailboat w/main, lapper & large winches, sleeps 4, \$2995. Erickson, 488-1901 or Axford, 932-4059.
 14' Hobie Cat w/trailer, xint cndn, \$950, see at Kemak Elks Lodge. Starnes, 337-2816.
 4hp outboard motor, old Champion, runs good, \$15. DeMoss, 488-4019.
 Lido 14 sailboats, information on prices and condition of used Lidos for sale by owners. Hoover, 334-2392.
 18' fibreglassed plywood cabin cruiser, 35hp electric start Johnson, trailer w/misc ski equip, \$650. Glebe, 488-2285.
 Depth-finder, Lowrance Fish Lo-K-Tor, portable, half-price, pfct cndn. Garrison, 334-2108.
 5hp Eska w/¾ gal tank, economical, \$75 firm. Lapko, 946-4311.

PROPERTY & RENTALS

Wooded canal lot in Oak Harbor, boat access to Clear Lake, reasonable price. Workman, 337-1922 after 5 weekdays.
 Invest in land, \$1000-up. Burton, 481-0780.
 Rent—two new townhouses, Clear Lake City, all elec, 2 bed, 1 bath. Miller, 488-0621 after 4.
 Furnished beach house, gd cndn, 3 bdrm, large stor rm, 24 x 14 living area, gd beach view, yr-round fun, \$12,000. Wade, 649-0554.

CAMERAS

Soligor 28mm f/2.8 wide angle lens for Pentax, \$45. Erickson, 488-1901.

MUSICAL INSTRUMENTS

Klira 12-string guitar w/case, \$65. Also Kay 6-string guitar \$35. Brunenmeister, 481-3558.
 Compact Wurlitzer organ, custom '100' amplifier, \$500. Gibson electric guitar, cherry red, \$350. Byington, 649-3252.
 Fender super reverb amp \$250. 53 Gibson Les Paul guitar, white, cobalt pickup, \$500. Franklin, 526-0428.

ACTIVITIES

Non-profit Hobby-based aero club expanding equipment and membership. Cessnas 182, 172, 150, Yankee and Taylorcraft. Doiron, 482-7829.

LOST

Keg ring w/6 keys, lost March 16, Lingle, 483-5371.



← ACHIEVEMENT AWARD — Space Environment Test Division of E&D convened in front of the big vacuum chamber door to accept congratulations and group achievement award certificates from E&D Assistant Director for Chemical and Mechanical Systems Aleck Bond (that's him in the middle of the front row, between two women. Forty-one more names are too many to list, so each participant must identify himself — we will say that Marion Lusk, Jack Breiby and John Burton missed the ceremony. The award was for "outstanding contributions to the preparation, operation, and analysis of the thermal-vacuum tests of the Apollo/Sky-lab command and service module 2TV-2, the extravehicular mobility unit, the lunar communications relay unit, and the ground controlled television assembly. The successful accomplishment of these tests was a key factor in insuring the readiness of the spacecraft and the support equipment for flight."

NASA Facts: Food for Space

Turkey Dinner by Moonlight was Breakthrough

Part 1 of 'Food for Space' ran in the last issue of the Roundup. It dealt with the nutritious but not too appetizing food developed during Mercury and Gemini.

* * *

The biggest improvement early in the Apollo program was the addition of colder and hotter—about 50 degrees F from the chilling unit, 150 degrees from the heater compared to a range of 80 to 100 degrees in the Gemini spacecraft.

Otherwise, the food was pretty much the same from one program to the other—until Christmas 1968.

The Apollo 8 crewmen, during man's first inperson look at the Moon, opened a surprise package: gravy-covered chunks of turkey, cranberry applesauce, and a spoon to eat with.

It was the first authorized "home-cooked" meal on a United States space flight.

Once Apollo 8 demonstrated space-food could be eaten in a more natural way, with a spoon rather than through a tube, further improvements were made.

Rehydratables were put up in "spoon bowl" packs. After hot water is added to the freeze-dried food, pressure-type plastic zipper along one edge of the pack is opened and the contents spooned out.

The larger opening makes possible larger chunks of food for meals such as beef stew and shrimp cocktail.

Another welcome addition was slices of bread and several flavors of sandwich spreads.

The freeze-drying process used to prepare the space-food—and many new products on supermarket shelves—is a relatively simple one.

Raw or cooked frozen foods are placed in vacuum chambers, and heat is applied to melt the ice. Under vacuum, the water "sublimes" or changes directly from the solid state (ice) to a gas without going through the liquid state.

The vapor is drawn from the chamber, leaving behind a dried food that still has much of the flavor, nutrition, and appearance of the original.

Skylab meals will feature four different types of foods:

- Ready to eat rehydratable foods such as cream of tomato soup, scrambled eggs, salmon salad, beverages, and deserts;

- Pre-cooked, thermally stabilized or fresh food with moisture content reduced to intermediate range (20 to 45 percent), such as dry roasted peanuts, cookies, or bacon wafers;

- Pre-cooked or thermally stabilized food with 50 to 80 percent moisture content—turkey

and gravy, meat balls with sauce, or pudding;



FOOD EDITORS AT MSC — The history of space food, with emphasis on the improvements scheduled for Skylab, held the interest of food writers and editors from newspapers and magazines around the country when they visited the Manned Spacecraft Center last month. Expertise was provided by Dr. Malcolm Smith of Medical Research and Operations Directorate.

and gravy, meat balls with sauce, or pudding;

- Pre-cooked or fresh food kept frozen at below zero temperature until it is prepared for eating, including prime rib of beef, filet mignon, shrimp cocktail, and lobster Newburg.

A correctly designed diet is necessary to maintain an astronaut's health at the desired level.

Experience gained from Gemini indicated that less energy is needed to work in weightlessness, so daily calorie intake was reduced

Poetry Festival Scheduled June 1

Cash prizes from \$5 to \$25 for the best poems on selected subjects are offered by the Houston Chapter of the Poetry Society of Texas in Preparation for the annual festival on June 1.

Entry information is available from Betty Kersh, Route 2 Box 226K, Cypress, and information on or tickets to the festival can be gotten from I. B. Kahn, Box 1b, Houston 77001.

Cost Reduction Corner

Spacecraft Schedule Analysis on the Review Program (SARP) were prepared manually on 8½ by 11 chartboards until Don Haulbrook of Program Support Division, Administration and Program Support Directorate, reported detailed schedules used by the Skylab program manager in the control room photographed and reproduced.

Result: eliminates manual preparation of chartboards, satisfies Headquarters reporting requirements.

Estimated saving to John Q. Taxpayer: \$24,000 a year.

to between 2300 and 2500 during Apollo.

Skylab menus will vary from 2000 to 2800 calories a day.

Crew members have experienced weight loss on almost every space flight. Just how much and how directly this effect is related to food and water intake is being

On flights of a year or more into deep space, for instance, even a slight overcalculation of daily food requirements could mean excessive weight and volume penalties to the spacecraft.

On the other hand, an underestimate could be disastrous.

The science of space-age nutri-

MSC Picnic

(Continued From Page 1) stamped; in event of tie, earliest submittal wins.

4. Suggested theme must be explained sufficiently so it can be implemented.

5. Clearly printed or typed entries must include entrant's name, office phone, organization and mail code on the entry but NOT ON THE ENVELOPE.

Hams to Auction Electronic Gear

The MSC Amateur Radio Club is sponsoring an auction of electronic and electronic equipment—radio gear, hi-fi equipment, television sets, etc.—Saturday, April 8 at 10 a.m.

The auction will be held in the community building at the Harris County Park across from the Boys Home on NASA Road 1. Doors will open at 9 a.m., and there will be coffee and donuts for sale.

Further information may be obtained from Ed Hamblett extension 5867.

Shuttle Regulator Proposals Asked

Approximately 20 industrial firms have been invited to submit proposals to study helium regulator systems that could be used by the Space Shuttle orbiter.

Helium regulators comprise part of an Orbital Maneuvering System (OMS) package—rocket propulsion the craft uses while flying in space.

carefully studied, and the findings could mean even more changes to the space menu.

The psychology of eating in space also is being viewed with interest.

The spoon-bowl packs and sandwiches already have contributed to making dinner in space seem more natural and, therefore, enjoyable.

Skylab will go a step further with a special tray being developed to let each astronaut heat his own meal. The tray, 13½ by 15 by 4½ inches, has individual recessed compartments with built-in heating elements.

The heated food is eaten with conventional utensils right from the tray compartments.

Understanding how much food an astronaut needs, and making every attempt to have him actually eat what is planned for him, is important not only to astronaut ability to perform certain tasks in space, but to the conduct of the overall mission.

Bargain Doesn't Include Europe

That group-rate fare to the East Coast offered by Hanssen Travel Service does not include the NASA Employees Club's charter flight to Europe as some bargain-hunters hoped. The story in last issue told about the special rate of \$132.20 for a flight that connects with the Europe charter on May 28.



UPS AND DOWNS — These are scenes from the Employees Activities Association skating party at the Skate Ranch two weeks ago. Some of the skaters were a bit wobbly, a few took spills, many wound up with sore muscles the next day, and all had fun.