

PICNIC TIME—Susan Corderas and Jim Rayl, co-chairmen of the MSC-EAA Picnic Committee, pose with one of the attractive posters seen around the Center, advertising the picnic and its carnival theme. The posters are the effort of Barbara Matelski of the Management Services Division. Set for September 25, the picnic will be at Camp Manison in Friendswood. (See "Picnic Schedule" on page 2).

Science research results revealed

Six scientists involved in analyzing the Apollo 15 experiments and sample returns met with the press last week to discuss scientific results gleaned so far from last month's lunar mission.

Dr. Isidore Adler from Goddard is principal investigator for the lunar orbital X-ray fluorescence experiment. Concerning X-ray astronomy, he noted that there were some 48 orbital passes of useful data in addition to several hours of data taken during transearth coast.

Aluminum silicone intensity ratios for the eight surface tracks plotted to date have shown that with some exceptions, according

to Adler, "the highlands are markedly higher in aluminum than the mare areas."

Since the activation of the Apollo 15 ALSEP station, the third station now operating on the moon's surface, 39 seismic events have been detected.

One of the events, a moonquake, Dr. Gary Latham, principal investigator for the ALSEP passive seismic experiment, said, "was very likely the most significant event we've ever recorded on the moon . . . primarily because it came from the active zone—that zone we call A-1 which accounts for 80 percent of the seismic energy we record—and secondly because it was recorded at all three stations and therefore allows a determination of the source region."

The best estimate of location places this moonquake over 1100 kilometers south of stations 12 and 14 and at a depth of 700 to 800 kilometers.

"Implications of great depth," Latham continued, "are many and quite interesting. It means, for example, that the moon must be rigid enough at those depths to support sheer stresses, i.e., it must support rupture."

"In the earth, the deepest known earthquakes occur at about 720 kilometers and those are very rare. So we're talking about depths equal to or even greater than the deepest earthquakes."

"We find, as you know, that the moonquakes occur with rather constant relationship to tides. They are triggered by tides.

This would imply a linear build-up of stress in the moon, which is triggered once a month as the tidal stress approaches its maximum.

"The most likely source of such stress is thermal, but that does not mean that the point of highest temperature in the moon is at 7 to 800 kilometers. It means that at that depth, the greatest stresses resulting from the temperatures of the moon occur."

Through a new data processing method which enhances the faint signals from the moon, scientists have learned that swarms of moonquakes occur.

"I think," Latham said, "that the observation of moonquake swarms and that the moon may have associated with it much greater active seismic energy than we anticipated has really been a revelation to us, in addition to the fact of observing the moonquakes at very great depth."

Dr. Marcus Langseth, principal investigator for the ALSEP heat flow experiment, feels that the most important results being obtained from the experiment are the temperature measurements below 90 centimeters (32 to 57 inches) beneath the lunar surface.

The gradient measurement, Langseth said, is about 1.7 degrees Centigrade per meter, which works out to about a degree Fahrenheit per foot.

"Now that's a pretty substantial gradient," Langseth stated, "however, our measurements of conductivity indicate (See SCIENTISTS, Page 4)

Office seeks jobs for employees affected by RIF

The Outplacement Office in Building 45 continues in its effort to find positions in industry and government for employees who have been adversely affected by the reduction in force.

A limited number of people have already been placed in jobs. The Office hopes that the number of placements will accelerate in the next four weeks.

John Lovejoy of the Personnel Division, which operates the Office, stressed the importance of employees' getting their completed resumes and form 171's into the hands of the outplacement counselors.

UN Salutes Apollo 15

The following is a message delivered by United Nations Secretary General U Thant on August 24 in New York City, where the Apollo 15 astronauts, Dave Scott, Al Worden, and Jim Irwin, were guests of honor.

Distinguished astronauts, Ambassador (George) Bush, President of the Security Council, your Excellencies, ladies and gentlemen.

On behalf of the United Nations, it is my distinct privilege, not only to welcome and greet the most distinguished astronauts who have graced the headquarters of the UN with their presence, but also for this presentation of the replica of the plaque which they have landed on the lunar surface.

In commemoration of those astronauts and cosmonauts who

have given their lives in the performance of their historic functions, this presence and this presentation represent a symbol, a very significant symbol to all of us at the United Nations because of the identity of interest and the identity of purpose and the identity of ideals.

You distinguished astronauts have commemorated the fallen astronauts and cosmonauts for their very valiant search to discover outer space for the enrichment of all mankind.

Earth, our little planet earth, as you saw from the moon, is also very symbolic of the aspirations of all of us at the United Nations. You saw our planet earth from the moon as an indivisible entity,

(See THANT, Page 2)

Berry Named Head of NASA Life Sciences

Dr. Charles A. Berry, MSC's Director of Medical Research and Operations, was named last week to the post of Director for Life Sciences at NASA Headquarters.

He succeeds Dr. James W. Humphreys, Jr., who left NASA to become secretary-treasurer of the American Board of Surgery in Philadelphia.

As NASA Director for Life Sciences, Berry will be responsible for management of all life science activities in the Office of Manned Space Flight. These activities include biomedical and bioscience research, associated flight experiment definition, advanced life support and protective systems, man-machine integration and advanced bio-instrumentation. He

will also have overall responsibility for integration of the total life sciences program, which includes activities in other NASA offices.

Dr. Berry joined NASA in 1962 as Chief of MSC's Medical Operations Office. He became Director of Medical Research and Operations in May 1966.

Prior to joining NASA, he was Chief of Flight Medicine in the Office of the U.S. Air Force Surgeon General from 1959 to 1962.

He received his doctor of medicine degree at the University of California Medical School, San Francisco, and a master of public health degree from the Harvard School of Public Health.

(See BERRY, Page 2)

AIAA Honors E & D's Dr. Cox

Dr. Kenneth J. Cox, Chief of the Systems and Analysis Branch, Guidance and Control Division, recently received the American Institute of Aeronautics and Astronautics (AIAA) Mechanics and Control of Flight Award.

Presented during an AIAA gathering at Hofstra University on Long Island, New York, the award and its \$500 honorarium were given jointly to Dr. Cox, Dr.

Georgy Cherry of NASA Headquarters, and Dr. William Widnall of Intermetrics, Inc., Cambridge, Massachusetts.

Cox was specifically cited by the AIAA "for pioneering the development of the digital control systems for space vehicles and the application of these techniques to the Apollo Command and Service Modules and the Lunar Modules."



Dr. Kenneth Cox (right) has just received the congratulations of Robert A. Gardiner, Assistant Director for Electronic Systems, Engineering and Development Directorate, on Cox's Mechanics and Control of Flight Award, presented to him by the AIAA.



City of Houston honors Ben Davis

Ben Davis of the Management Services Division recently received a resolution signed by Mayor Louie Welch and the Houston City Councilmen honoring Davis for his work in organizing a volunteer group called the Girls in Gray.

Ben founded the group several months ago to serve the needs of elderly patients of varied racial backgrounds at the St. Thomas Convalescent Center in Houston.

Approximately 20 volunteers are now active in Ben's group, and he himself spends several hours each day working with the

NOTICE: Around publication time of the last *Roundup*, two school zones were posted on Eldorado Boulevard in Clear Lake City. The speed limit in these areas is now 20 mph from 7 to 9 a.m. and 2 to 4 p.m. MSC and contractor employees using Eldorado to connect with the Center's back gate are reminded to observe the speed limit in the two school zones.

elderly people.

Primarily, the volunteers instruct and aid the patients in learning handicraft skills. Piecing quilts is popular with many of the ladies, and the men particularly enjoy woodworking. Several of the elderly in the center are now working together to build a radio. The senior citizens may sell the products of their efforts if they so desire.

The resolution says in part, "Whereas Mr. Davis devotes his free time each day to serving others who are in need, and thereby fills a vital role in citizenship that makes our Houston community a happier and healthier place in which to live . . . City Council hereby offers this statement that all those to whom it may come may know that Ben Davis has been and is a devoted and dedicated citizen and humanitarian."

Ben hopes that eventually his group can serve other homes for the elderly. But for the moment, there is plenty of work to be done with the patients at the St. Thomas center.

Picnic Schedule

Don't forget the MSC Picnic on September 25 (that's just two weeks from tomorrow)! The schedule of events includes something for all ages, from the hay-stack treasure hunt which should please the small-fry to the presentation by an all-girl band, called Adam's Rib, which should please everybody.

The many carnival booths will include a fish pond, bumper car, cork gun, ring-a-block, and tic tac toe, among others, and there will be prizes galore.

See your EAA representative for tickets which will go on sale Monday, September 13.

11:00- 5:00	Kiddie Rides
11:00- 4:30	Hay Rides
11:30-	Flying Matadors trampoline team
12:00- 3:00	Food Service
12:00- 4:00	Band - Adam's Rib
12:00	Cygnets swim team
12:30	Flying Matadors trampoline team
12:30- 4:30	Carnival Booths
1:00	Cygnets swim team
1:00	Hula Hoop Contests, age groups 12 and under; and 13 and over
1:00- 5:00	Dunk Tank
1:30	Flying Matadors trampoline team
1:30	Hop Sack Races, age groups 5-7, 8-10, 11-12
2:00	Cygnets swim team
2:00	Hot Potato!, age groups 5-7; 8-10; 11-12
2:30	Flying Matadors trampoline team
2:30	Treasure Hunt, Hay Stack, age groups 2-4; 5-6
3:00	Cygnets swim team
3:00- 5:00	Texas Hot Shots accordion band
3:30	Flying Matadors trampoline team
3:30	Shriners Shooting and Fast Draw Exhibition
4:00	Cygnets swim team

Facilities and equipment will also be available for volleyball, softball, ping pong, and horseshoes.

Mariner continues enroute to Mars

The Mariner 9 spacecraft, launched on May 30, should complete its 103rd day of travel today, September 10, on its 248 million mile journey to Mars.

In the last Mariner position report received by the *Roundup* office from NASA Headquarters, the 2200-pound spacecraft was 25 million miles from Earth as it slowly drew away from the mother planet towards the orbit of Mars. It is traveling on a curving path around the sun at 61,000 miles per hour relative to the sun.

The previously abnormal high rate of usage of the nitrogen gas in the attitude control subsystem has stabilized to a normal 4 to 6 thousandths of a pound per day. There is sufficient gas to allow orbital operations of one year.

On November 13, the flight path of Mariner 9 will intersect the orbital path of Mars and the firing of a 300-pound thrust re-

STOP RISING COSTS!



*With
Good
Ideas*

Thant's message to Apollo 15 crew

(Continued from Page 1)

a small planet orbiting in space, without boundaries, without frontiers, without any indication whatsoever of which part is rich and which part is poor; which part is black and which part is white; which part is yellow.

This is a correct vision of this small planet. This is in strict conformity with the aspirations of the charter of the United Nations.

Distinguished astronauts, you have the correct prospective of this little globe, which we are trying to fashion in a way we like, in strict conformity with the terms of the charter to achieve a great harmony.

You have led the way. Therefore, your presence in the United Nations today has a very special significance to all of us who are striving to achieve the objectives of the founding fathers 26 years ago: to achieve harmony; to achieve synthesis, with the realization that this little planet is indivisible on the basis of color or creed or religion.

Distinguished astronauts, I want to take this opportunity of thanking Ambassador Bush, also, and his very capable staff at the U.S.

tro engine will insert Mariner into a Mars orbit.

Basic objective of the mission during 90 days in orbit is mapping of about 70 percent of the Martian surface with two television cameras. Other experiments will record atmospheric and surface data.

mission for having made this visit possible and for having made this evening both instructive and educational.

I wish you all continued success in your search for more knowledge, more positive knowledge, for the betterment of mankind.

Berry assigned to Headquarters post

(Continued From Page 1)

At the time NASA Headquarters announced his appointment, Dr. Berry was in Europe where he will be attending the 22nd International Astronautical Congress in Brussels, Belgium; the fourth International Symposium on Basic Environment Problems of Man in Space, in Yerevan, Armenia; and the USA USSR Joint Working Group on Space Biology and Medicine meeting in Moscow.

Dr. Berry will continue in his present post at MSC until a successor has been appointed.

100 still to go

There are just 100 tickets left for the October 17th Detroit Lions vs Houston Oilers football match at the Astrodome.

The tickets, which regularly sell for \$7, are available through the EAA for \$5 each.

See Joanne Sanchez, Building 2, Room 317, or Marie Wilmeth, Building 45, Room 758 to buy your ticket.

Awards at MSC-Downey



J. A. Davison, Chief, QA, Reliability and Safety Office, recently made presentations to (row 1) Betty E. Anderson, 20-year service award; Dennis E. Cushman, 15-year service award; row 2) Harold J. Sweet, 20-year service award; and Charles M. Page, Sustained Superior Performance award.

ROUNDUP

NASA MANNED SPACECRAFT CENTER HOUSTON TEXAS



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Editorial Staff: Sydni Shollenberger, A. "Pat" Patnesky

Roundup Swap-Shop

(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)

MISCELLANEOUS

3 HP go-cart, xln cndn, \$100. Cox dune buggy, .049 engine, \$8. 200 power refractor telescope like new, \$18. Vincze, 877-2237. Browning 243 automatic rifle w/ 3 x 9 variable scope plus other extras, xln, \$200. Donnell, 877-1746. Maple brown couch, \$50; chair, \$25; end tables and coffee table, \$15 each; convertible buggy/stroller, \$20; baby swing, \$10. Lausten, 482-1004. Piano, Wurlitzer spinet w/ bench, about 5 years old, looks like new, walnut finish, cost \$750, sell for \$395. Spencer, 481-0150. Garrard 40 turntable, base and cover, 2 yrs. old, \$35. Watson, 591-2529. Heathkit depthfinder, model MI-11A, xln cndn, \$65. Mathias, 877-1047. Beige sofa, American walnut table and lamp, \$50. Gaffney, 483-4141. Used window unit air conditioner, good cndn, 12,000 BTU. Bell, 649-0978 or 649-3200.

10.8 cu ft refrigerator, good cndn, \$30. Hagan, 488-0044. Stereo w/ AM-FM radio, tape deck, turntable, separate speakers, \$200. Tomlinson, 483-4386. P-51 Mustang group being formed to own and fly perfect specimen of this fine old war bird. Grow, 944-9152. Baby equipment—high chair, portacrib, diaper pails, etc.; 4 breakfast chairs. Haines, 941-2495. Tire steal: 4 Firestone, red line wide ovals, 2 like new, 2 worn 670-15 tubeless, all for only \$25. Horton, 877-4102. Hardbound books, 25c each: antique sewing machine, \$20; antique chair, \$5. Foster, 534-5358 after 5 p.m. Blue Bird costume, size 8 in perfect cndn, wash and wear; ladies bowling shoes, like new, size 8, \$3.50; early American 4-drawer chest and bedside table. Klotz, 488-1514. Sears 3-speed thermo controlled window fan, \$10. Gold Kroehler swivel chair, \$15. Zenith B/W 20-inch TV, \$15. Marlowe, 482-3616. New International Everyman's Encyclopedia in the box, 20 volumes, 8,000 pages, 9 million words, \$35 cash. Lapko, 946-4311. Traditional stuffed rocker and matching ottoman, \$70. Caro, 488-5271. Refrigerator, needs repair, \$25. Antique sofa, good cndn, \$125. Baker, 985-5009. Doll clothes, Barbie, Ken, and Crissy, 25c and up, 311 Brandywyne Dr., Friendswood. Kilbourn, 482-3824. Singer Zig-Zag sewing machine, maple desk cabinet, good cndn w/all attachments, including button holer. \$430 value for \$150. Loden, 488-1745. Garage sale, Clear Lake City, 16-17 Sept., several families — antiques, children's clothes, household furniture, baby items. 1622 Neptune. CB radio & equipment. Suggs, 644-4631 after 5 p.m. Bundy alto saxophone and case, \$135. Edwards, 483-3688. CONN trombone, xln cndn. New, \$170; now, \$100. Shows, 877-4703. 8 1/2 x 11 oval rug, rust & gold tones, just cleaned. New, \$150, asking \$50. Shows, 877-4703. Dehumidifier, good cndn, \$40. Shows, 877-4703. Junior Girl Scout uniform, complete, wash-and-wear, size 12-14, \$5. Donohoe, 488-1432. Kroehler living room sofa, upholstered, grey, fair cndn, \$25. Richichi, 488-4487.

Piano, Janssen, light wood, xln cndn, spinet size, full sound 3-pedals, \$300. Grant, 591-3542 after 4 p.m. RCA 23" B/W console TV, 6 yrs. old; boat top, 72"-75" beam, \$45. Clowdis, 471-2447. Spear guns, two heavy duty arbalete champions, 43" shaft, center handle, \$15 each. Ross 946-6738 after 6 p.m. Spear gun, Mares Juni triple-wishbone, 62" shaft, spare trigger grip, \$25. Power head, \$20. Ross, 946-6738 after 6 p.m. Piano lessons, beginners to experts. Experienced teacher with music education degree. Beaton, 488-3190.

VEHICLES

Chevy II 190, 6-cyl., 2-door, standard shift, good tires, radio, xln cndn, very economical, \$525. Vance, 483-5293. 62 Valiant, 4-dr. sedan, 39,000 miles, \$300. Donnell, 877-1746. 71 Yamaha 125 cc motorcycle with windshield and other extras, 400 miles, \$500. Donnell, 877-1746. 56 Chevrolet, 6-cyl., standard trans., tags, sticker. Would make good dune buggy or racer. Boykin, 877-2142. 64 VW, has factory air conditioner, many miles, everything works, \$450. 932-2836 after 5 p.m. Honda mini trail, practically new, less than 600 miles. \$400 includes 2 helmets. 932-2836 after 5 p.m. 69 Ford Torino, G.T., fastback, manual, A/C, radio. Biggs, 471-2745. Kawasaki Mach III, 4500 miles, perfect cndn. Best offer over \$800. Jones, 479-5769. 68 motorcycle 500cc Triumph, very good cndn, have two, must sell one. Eickmeier, GR1-2526. 71 1/2 Yamaha 125cc Enduro, perfect cndn, best trail and street bike made, signal lights, electric start, low mileage, cost \$650 new, must sell, \$499. Getting car. Horton, 877-4102. 69 VW Karmann Ghia, automatic stick shift, A/C, xln cndn, \$1750. Harris, 877-2651. 70 Maverick, 2-door, 19,000 miles, air, radio, 6-cylinder, \$1675. Weeks, 941-6555 after 6 p.m. 66 Chevrolet Caprice, A/C, power steering and brakes, good tires, clean, \$875. Burton, 471-0778. Travel trailer, sleeps 6, ice box, range w/ oven, electric brakes, low profile, parks in garage. Melugin, 471-4267. Honda SL90 (Motorsport), licensed with title, new rings, good cndn, runs good, \$150. Dusenbury, 877-3230. 65 Chev Malibu wagon, V-8, air, auto, xln cndn, one owner, \$1000. Smith, 488-3236. 10-speed English racing bike, only 8 months old, xln cndn. Bell, 649-0978. 63 Cadillac, vinyl top, xln cndn, \$750. Call 747-3451.

BOATS

15 1/2' Snipe sailboat, like new, with trailer, \$750. Holzapfel, 483-4401. 16' Baymaster and trailer with 75 HP outboard, \$500. Foley, 877-4848. 34' cruiser, cypress hull, twin engine, \$1000. Hicks, 591-3450. 14' Hobie cat sailboat, 1 yr. old, xln cndn. Bruns, 877-2004 after 5 p.m. Circumnavigate the world or just Galveston Bay in this beautiful 25' cruising fiberglass sloop. Fantastic inventory. Briscoe, 966-1777.

REAL ESTATE AND RENTALS

For rent, Seabrook near intermediate school: 4-2-2 brick, carpeted, fenced, 3-years old, \$250/month. Penrod, 877-4998 evenings. Choice Big Bend 40 acres, hunting; access to 3600 acre reserve, lake, picnic area. Low equity, assume payments, no interest. Storey, 932-4618. Fairmont Park, 3-2-2, central air and heat, fenced yard, nice trees, large workshop, \$22,500. Larson, 471-0068. Residential lot, 100 x 135' in southeast Houston and 2 residential lots in northeast Houston. Bennett, 649-3576. Waterfront lot on Demi John Island, only 1 hour from the NASA area. Bulkheaded, restricted, on unpolluted Bastrop Bayou, water skiing, fishing. Klotz 488-1514. 80' x 200' beautifully wooded lot, Dickinson, all utilities, \$4500. Plauche, 477-2660. Private camping lot, Texas Campgrounds, Conroe area, heavily wooded, pool, electricity, showers, laundromat, fenced, caretaker, \$625. Call 472-8208.

PETS

Miniature Schnauzer, female, papers. Born 16 May 71. \$85. Witt, 748-2530 or 729-9980. Show quality poodles, silver beige, miniature or toy, 8 weeks, AKC, shots, champion line. DeVore, Alvin 585-6227. Burmese kittens, lovable dispositions from outstanding bloodlines, \$50 and up. Atkinson, 633-1735 after 6 p.m.

WANTED

Chest of drawers. Haines, 941-2495. Amateur radio transmitter, receiver, accessories, oscilloscope. Witt, 748-2530. Bicycle baby seat. Horton, 474-2102. For son's Eagle project, Cub, Boy, or Explorer uniforms (equipment also), for needy Scouts' use. Balinas, 946-3907.



VATICAN VISITOR—Archbishop Giovanni Benelli, Deputy Secretary of the Department of Secretary of State, Vatican City, was a recent visitor to MSC. Here he talks with Center Director Robert R. Gilruth (right). Colonel James McDivitt, Apollo Spacecraft Program Manager, was the Archbishop's host during his tour of MSC facilities.

Feeling run down?

Why not recharge your batteries by getting started in a physical fitness program?

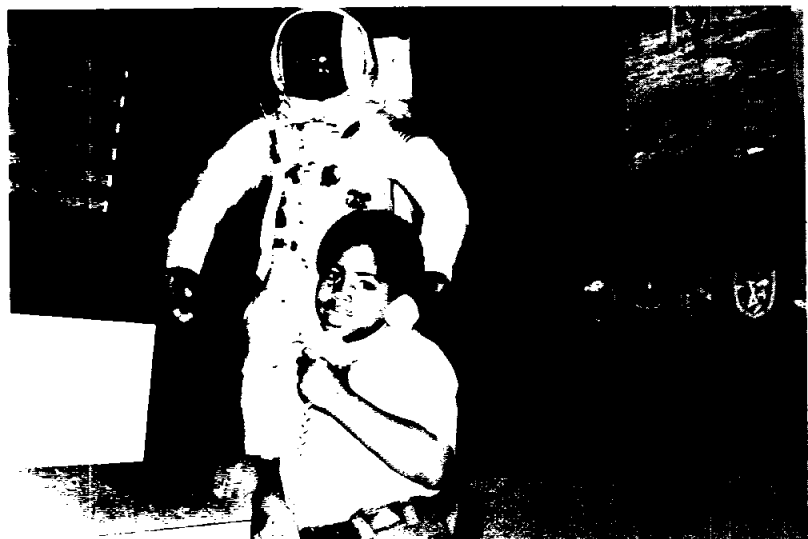
Did you know that there is a jogging track behind the softball fields in the MSC recreation area? There are also two volleyball courts.

Both the track and courts are in a heavily wooded area, particularly lovely in the fall months ahead. Deer can often be seen nearby. The afternoon sun filters gently through the arched trees and will soon light on red-berried yupon.

Some interested employees are trying to determine how many people use the facilities. There is a sign-up board posted on a tree near the track. If you jog or play volleyball, you are encouraged to sign your name.

Why not resolve today to start your own jogging or exercise program. And, in the bargain, you'll get the delightful extra of a beautiful natural setting.

TEN YEARS AGO — On September 19, NASA announced that a site near Houston had been selected for the manned space flight research center which would design, develop, evaluate, and test Apollo spacecraft and train the astronauts for lunar flights and other space missions.



IT'S COREY BAKER!—Nine-year-old Marc Copage, who plays the role of Corey on the TV show "Julia," visited the Center recently. He was most impressed with the exhibits in Building 1, particularly the "talking" displays. Seeing an astronaut in the water tank simulating weightlessness was exciting for Marc, too. His one request of MSC host and tour guide Tom Walton? "Please, can I have a hot dog?"

Circle the date on your calendar

The Employees Activities Association, busy now with plans for the September 25th MSC Picnic, is already looking ahead to the 1971 Christmas dance.

The yule event this year is set for Saturday, December 11 at the Shamrock Hilton Hotel in Houston.

Mark the date on your calendar today. You might note, too, that there are "only" 90 shopping days til Christmas!

Generation gap? Not really!

WASHINGTON — Hairwise, engineers and other male employees of NASA are generally a pretty close-cropped lot (although creeping sideburns have been noted).

What brings this to mind is that a long-haired lad was in the office (at NASA Headquarters) the other day looking for background information with an eye to producing a space rock opera.

On the surface and apart from the hair, his proposal was startling for two reasons: One, we never thought of space providing material for a musical art form, and two, we thought the kids were into ecology to the exclusion of just about everything else.

We shouldn't have been surprised for a number of reasons.

Standing so close to the space business, we get caught up in trajectories and hardware and tend sometimes to forget it's a pretty exciting business. In another era, back in the late thirties and early forties, space exploration might have been subject of a whole series of romantic movies like those made about test pilots or biographies of scientists like Louis Pasteur and Thomas Edison.

As for the environment, NASA is involved in reducing aircraft noise pollution. It is also developing remote sensors for use on airplanes and such spacecraft as the Earth Resources Technology Satellite (ERTS).

Remote sensors aboard the ERTS promise to provide information on a wide range of phenomena, including water resources, censuses of crops and forests, geological surveys, ice breakups, and earthquake fault lines.

The young and those of an older generation who stand forth as spokesmen to and for the young have taken some strong anti-technology stands. Yet, there are a lot of plastics in much modern art, and a lot of

electronics in guitar amplifiers and Moog synthesizers. And then there is a young man who is interested in a space rock opera.

Dr. Wernher von Braun has said, "Those who look upon science and technology as a megamachine that dominates their lives and holds them in thrall to a strictly programmed existence have their own special hang-ups."

There is another view, and it was expressed by Glenn Seaborg, former head of the Atomic Energy Commission: "The difference is . . . a positive outlook, some imagination, and the desire to put science to work more creatively."

Center lets two Shuttle Contracts

MSC has recently awarded technology contracts to two aerospace companies for the study, design, development and test demonstration of hardware to be used for thermal control of propellants in the auxiliary propulsion systems (APS) of the Space Shuttle.

The contracts are with Textron, Inc., Bell Aerospace Division, and Rocketdyne Division of North American Rockwell Corporation.

A variety of propellant feed systems is being studied. While the systems are configured differently, one common characteristic is that all hydrogen and oxygen is delivered to the thrusters in gaseous form. Shuttle designers prefer a gaseous mixture because of the greater difficulty in delivering cryogenic liquids to the many engines.

Some type of thermal conditioning is necessary to convert the stored liquids into gases and then to hold adequate quantities at proper temperatures in some sort of holding tank.

MSC's Power and Propulsion Division will monitor the two contracts.



"Neither rain nor sleet nor lunar storms . . ."—kept Apollo 15 crewmen Dave Scott and Jim Irwin, while they were on the lunar surface, from cancelling the Apollo 15 stamps on the postcard being presented here by Colonel James A. McDivitt (left) to Paul Ruddell, Assistant Manager, Philatelic Affairs Division, U.S. Postal Service. The stamps, a two-part set designed by artist Robert McCall, illustrate a lunar module and lunar roving vehicle on the moon's surface and commemorate the historic Apollo 15 mission.

Marshall studies productive ways to use space trash

Learning to do something productive with trash and garbage—the desire of Earth-dwellers and spacemen alike—may be the outcome of an effort being sponsored by NASA at the Marshall Space Flight Center in Huntsville.

NASA is studying the use of ordinary trash as a spacecraft propellant in large space stations of the future.

What to do with space waste—paper, plastic wrappings, left-over food, etc.—is of considerable concern to long duration mission planners.

New Source of Oxygen is found

Astronauts on future space missions may breathe oxygen reclaimed from moisture in their own breath and perspiration.

A prototype water vapor electrolysis system developed at Ames Research Center in California has successfully completed more than 2,000 hours of testing, equivalent to an 80-day space mission.

The new system converts moisture in the air directly into hydrogen and oxygen and releases the reclaimed oxygen back into the air.

The average person breathes about two pounds of oxygen daily, but he puts back into the air about three pounds of carbon dioxide and water vapor by expiration and perspiration.

The Ames conversion system may mean that bulky tanks of breathing oxygen will be unnecessary on future space missions. It would also reduce the load on humidity control equipment by removing excess water vapor from the cabin atmosphere.

For over a year, NASA and the United Technology Center (UTC) in Sunnyvale, California, investigated the possibility of burning trash as a fuel for Space Station Attitude Control propulsion.

The possibility appeared feasible, and last May, Marshall awarded UTC a contract to produce a dozen trash grain cartridges and a propulsion unit for actual ground tests.

The pulverized trash would be mixed with a binder and compacted into cartridge form by using equipment in the spacecraft. Each cartridge would then be inserted into a small rocket motor case fitted with a nozzle and ignition system.

A unit of this type, coupled with an oxidizer system, is called a hybrid rocket—part liquid and part solid. The combustion is controlled by adjusting the oxidizer flow.

These rockets could provide the

Safety office sets schedule of films

Safety films to be shown this month include a four-part Key Man Series and a movie entitled "Margin of Safety."

The Key Man film will be featured in the Building 30 Auditorium at 11:30 on September 14. The "Margin of Safety" will be shown on September 21 at 10:00 a.m. in Building 9, Room 132 and on September 22 at 11:30 a.m. in the Building 30 Auditorium.

Each person attending the movies will receive a Snoopy safety decal.

For special showings to an audience of 10 or more people, call extension 5210.

thrust needed to keep the space station on course, to offset the velocity imparted by docking spacecraft, and to maintain the proper attitude in space. This would also solve the problem of what to do with space garbage.

The study, still in its early stages, is scheduled to be completed at Marshall by early February 1972. Under the contract, Marshall will receive one thruster and 12 "replacement fuel grains" which will then be tested at the Lewis Research Center in Cleveland, Ohio.

Neurologists Meet

The question of applying space age technology to diagnosis, treatment, and rehabilitation of neurological disorders is being confronted by a group representing Federal and state governments, research institutions, and industry at a three-day meeting this week in California.

Sponsored by the United Cerebral Palsy Research Foundation and NASA, the meeting began on September 8 at Ames Research Center. It has brought together physicians, scientists and engineers to survey "Technology and the Neurologically Handicapped."

Dr. DeMarquis Wyatt, Assistant Administrator for Planning at NASA Headquarters, was among those who spoke at the opening sessions.

Presentations include "Treatment of Neurological Injuries," and "Neurological Applications of Man-Machine Systems Analysis."

Zero In On Safety

Scientists discuss Apollo 15 findings

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that the regolith material has an extremely low thermal conductivity, "which accounts for the high rate of increase in temperature.

"I'd like to warn against extrapolating these temperature increases with depth," he said. "When you get down into the more consolidated material, below the regolith, the gradients would be much less."

Dr. Gordon Swann, principal investigator for Lunar Geology, and Dr. Leon Silver, Apollo Lunar Geology Investigation Team member, spoke about some of the sample findings.

"One of the most exciting things about this mission to the geologists," Dr. Swann said, "is that we can be pretty sure now that we're finally looking at real bedrock on the moon, the actual framework, structure of which the moon was made."

One of the interesting finds, he said, is the "famous Leon T. Silver Spur. This is one that's excited a lot of people because there appear to be some kind of parallel or sub-parallel planar structures which could very well be bedding or a depositional record."

Speaking of the white anorthositic rock ("maybe unfortunately named Genesis rock"), Dr. Swann said, "We think now that this is certainly almost a clast out of a breccia, just from looking at the photographs. And the significance of this is that, if it's a clast in a breccia, that means it has had a multiple history.

"The rock has been broken up and reincorporated which decreases the probability that this rock really represents the rock indigenous to the site. There is a higher probability that it has been transported from elsewhere. I don't think that decreases the value of the sample, but I think we have to consider it as something very likely not formed in this local spot."

Dr. Silver spoke of a number of highly interesting rock sam-

ples. "The green rocks reported to us," he said, "have a very distinctive character. They are comprised of magnificently colored spheres of green glass in a matrix of what was probably once glass."

Another distinctive sample is the large black rock which crewmen Dave Scott and Jim Irwin spotted from the LM window; which "is a great puzzle to us because, except for a few chipped surfaces, and those recently chipped, it is completely immersed in glass. It's as if somebody put it on a string . . . and just dipped it in hot glass. We still don't understand the mechanism for that."

Dr. Paul Gast, Chief of MSC's Planetary and Earth Sciences Division, said that "If we look at the surface of the moon, even with the naked eye, on a clear, full moon night, we see that the moon is a black and white object. If we look at more precise maps, like albedo maps, we see that even more clearly. We're beginning to see that that's not just an incidental characteristic of the moon."

"One of the things we see about the surface of the moon," Dr. Gast said, "is that virtually every rock—I can't think of any exceptions to this—is in some way related to an igneous liquid and is produced by melting and separation of an igneous liquid and crystals."

"Why," he continued, "does the moon start producing iron rich, aluminum poor rocks after it produced this other kind of igneous rock? Why was there this change in chemical composition?"

These are just two of the thousands of questions about the moon which scientists hope will be answered in the years of research that lie ahead. Building 31 will be modified to allow simultaneous handling of samples from previous missions to provide storage space for samples from the remaining missions.



135 YEARS WORTH OF SMILES—These happy gentlemen had just received service awards totaling some 135 years. From left to right they are Billy C. Dye, 20 years; Edwin W. Seivers, 15 years; Eugene F. Allen, 25 years; Edwin J. Burke, 25 years; James E. Hebert, 20 years; and Jack A. Jones, 30 years. Melvin A. Blankenship, 25 years; Braxton A. Leddon, 25 years; and Thomas J. Edward, 15 years, were not available at picture-taking time.