

Shuttle System Status

Tile Record Set

More than 590 thermal protection tiles were installed on Columbia, the week ending July 30, the second highest rate achieved since arrival at KSC earlier this spring. A total of 23,910 tiles are now on the vehicle, leaving slightly less than 6,000 more tiles remaining to be applied.

A weekly rate of 371 tiles must be maintained to support the late November move of the Columbia from the Orbiter Processing Facility to the Vehicle Assembly Building.

The previous week a total of 603 tiles were bonded to Columbia.

Flight Engines Pass

The last of three flight engines destined to power the Space Shuttle Columbia's maiden voyage into space passed its flight acceptance test this week with a successful 520-second firing, matching the running time required for flight to orbit.

Following an electrical and mechanical checkout, the engine was formally accepted from the contractor by officials of NASA's Marshall Space Flight Center. It was shipped to Kennedy Space Center on July 30.

The other two first-flight main engines have already passed their acceptance tests and were shipped to KSC several weeks ago.

LOX Tank Test

Structural testing of the liquid oxygen tank portion of the huge External Tank which provides propellant for the Space Shuttle is underway at Marshall Space Flight Center.

The 155-foot-long, 28-foot-diameter External Tank will feed 140,000 gallons of liquid oxygen, and 380,000 gallons of liquid hydrogen, to the three main engines of the Shuttle orbiter during the first eight minutes of the launch phase. At about 75 statute miles altitude, the tank will separate from the spacecraft and fall into the ocean. The External Tank is the only expendable part of the Space Shuttle.

The liquid hydrogen section of the External Tank, and the intertank structure which connects it to the liquid oxygen portion, have already successfully completed structural testing at the MSFC. The liquid oxygen tank tests are scheduled for completion by October.

Testing is conducted on a test tank identical to the flight tank. The first flight External Tank, for the Shuttle Orbiter Columbia, arrived at the Kennedy Space Center recently from the Michoud Assembly Facility.

The purpose of the test series is to verify tank design and validate the analytical math model to ascertain whether or not the tank will react as predicted with simulated flight loads. Test loads placed on the Structural Test Article reach 140 percent of design limit, to satisfy verification requirements.

The initial phase of testing with the liquid oxygen tank empty, but under internal pressure—has been completed.

The next test phase will be performed with the tank filled with a heavy fluid to simulate the acceleration effects of the liquid oxygen load in flight. The test fluid is known as "driller's mud"—a high-density material used in the petroleum industry.



Bye, Jove; On To Saturn

This amazing photo-montage pieces together Voyager photos of Jupiter and its four largest moons — Io, Europa, Ganymede, and Callisto. The Jet Propulsion Laboratory provided the fancy artwork. The moons are not to scale, but are in their relative positions to Jupiter.

The Voyager 2 spacecraft filled in several gaps left in the Jovian observations of Voyager 1 and made several significant contributions of its own, including the rocky composition of Jupiter's rings. The combined Voyager 1 and 2 missions provided scientists with an 8-month long running account of the characteristics of the Jovian system, particularly useful for the meteorological understanding of Jupiter.

Round-trip light time for the Voyager 2 encounter was 104 minutes, Voyager 1 round-trip time was only 74 minutes. Voyager 1 is presently about 650 million miles from Earth, Voyager 2 is about 550 million.

Encounter with Saturn for Voyager 1 will be November 1980 and for Voyager 2 August 1981. The primary objective at Saturn is to provide a detailed investigation of the planet, its rings, and the satellite Titan as well as the other Saturnian satellites. Voyager 2 then will proceed along a trajectory to encounter Uranus near the end of the next decade.

Pioneer 11 will provide preliminary reconnaissance of Saturn beginning September 1, next month.

Lunar Samples To Move To New Facility

The lunar sample collection which is kept here, about 724 pounds worth, finally has a worthy facility. Dr. Chris Kraft dedicated the new facility, Building 31A, on July 20 in ceremonies with science director Richard Johnston, planetary division chief Dr. Michael Duke, and which included the traditional ribbon-cutting.

The new facility has been under construction for the past two years. It cost about \$2.5 million and includes regulation vault doors for the sample storage section, and a four-chamber positive air system which prevents atmospheric contaminants from entering the building, and which would secure the samples in event of a hurricane.

The facility was approved for construction in the FY 1977 budget. The new building, known by planetary scientists as the Lunar Sample Building, has 14,000 square feet of space split on two floors. This is more than twice the storage and working space afforded by the Building 31 facility, which in effect was a temporary area carved out of office space in the building's core.

The sample building contains two

Astro Recruitment To Be Annual Event

The Space Agency will begin accepting applications for Space Shuttle astronauts on an annual basis. Applications by civilians will begin October 1 and end December 1.

Depending on the needs of NASA for pilots and mission specialists, a selection will be made from rosters of qualified applicants resulting from this announcement. The rosters will be established annually.

Successful applicants will be asked to report to JSC in mid-1980 for a one-year training and evaluation program as astronaut candidates, after which pilot and mission specialist astronauts will be selected.

Selected applicants will be assigned to the Astronaut Office and placed in responsible technical or scientific positions where they will receive assignments to the Space Shuttle Program and continue work in their scientific or technical fields, where practicable.

Mission specialists will continue in their chosen fields of research and will be able to propose, develop, and conduct space experiments.

Pilot applicants must have a bachelor's degree in engineering, biological or physical science or mathematics. They must have at least 1000 hours of "pilot-in-command" time in high performance jet aircraft, must pass a NASA spaceflight physical, and be between 64 and 76 inches in height.

Mission specialist applicants, while not required to be pilots, must meet the same education requirements and have at least three years of reliable experience. An advanced degree may be substituted for experience. Mission Specialist applicants must pass a NASA spaceflight physical and be between 60 and 76 inches in height.

Current regulations require that preference for appointment to Astronaut Candidate positions be given to U.S. citizens when there is an adequate source of well qualified citizens available. Qualified minority and women applicants are again being encouraged to apply.

Twenty-seven astronauts are currently available in Space Shuttle crewmen, including 11 scientists. An additional 35 astronaut candidates selected in 1978 are in training to qualify for selection to Space Shuttle crews. The number of new candidates to be selected in 1980 will be based on mission requirements and operational needs.

NASA Gives 5-Year Plan

NASA recently presented its five-year plan for fiscal years 1980 through 1984. Major new initiatives included in the new plan are summarized below.

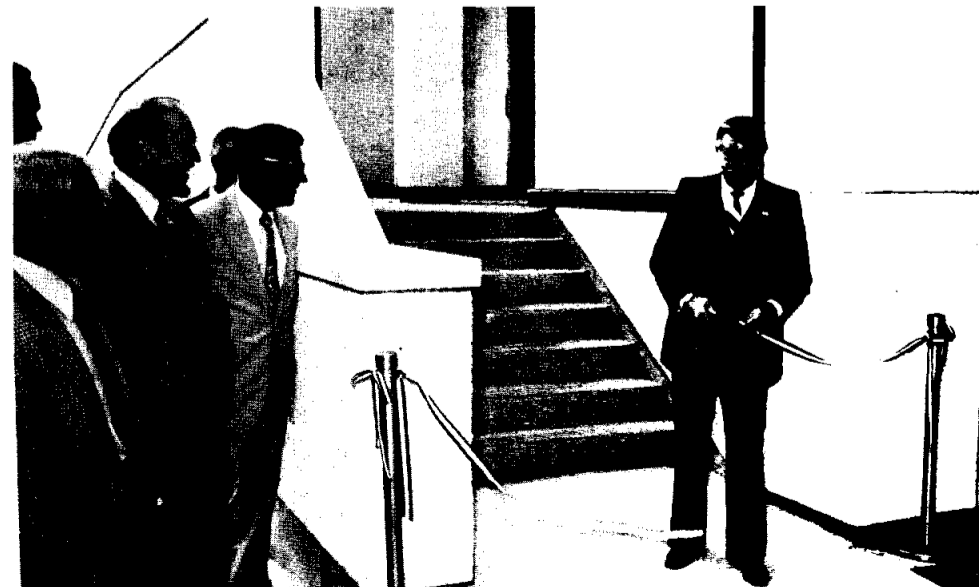
- Fifth Space Shuttle orbiter procurement would begin in FY 1981 for delivery in 1985.

- Shuttle improvements would begin in FY 1981. Two block changes are under consideration. They are replacement of the solid rocket booster with a liquid rocket booster, which might increase payload tare from 65,000 to 100,000 for equatorial launches. And a Shuttle-derived heavy lift launch vehicle. The HLVV would replace the orbiter with a recoverable unmanned payload carrier which would use the orbiter's engines and avionics for tare more than 200,000 pounds. Smaller scale improvements would include increasing staytime in orbit, increasing power, maneuvering, rendezvous, and docking capabilities, and system upgrades for most systems.

- Orbital Transfer Vehicle definition would start in FY 1981 and development could start in 1983 for delivery at undetermined time. The OTV would carry large systems to synchronous orbit, support manned missions at that altitude, and be capable of powering nuclear waste disposal missions and major space power technology work.

- Solar Electric Propulsion System development would begin in FY 1981 and development would lead to use in a

Continued on page 4



Center Director Chris Kraft cuts ribbon opening the Lunar Sample Laboratory while science director Richard Johnston, planetary division chief Dr. Michael Duke, and public affairs exhibits chief Charles Biggs scrutinize.

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Hizonner's Only 3

The Mayor of the Moon, little Rob Allen Carrell, 3 years old, of Seabrook. Rob was crowned mayor after winning the Little Mr. Lunar Festival Contest during Lunar Festival Days. His parents, Robert and Yvette Carrell, live on Todville Road in Seabrook. Little Rob has stated his goals as "preserving zoning and to make every citizen a healthy, well-adjusted Moonbeam," reasonable goals for a moon mayor.

Sports

JSC Mets Slug Way To Top

Allen is MVP

Miller Freeman Ford venturing out of the familiar confines of the Johnson Space Center for the first time this year captured Houston Cadillac Tournament first place.

In the first game the Mets played the Houston Police Department (Wild Bunch). After giving up one run on 3 walks and a single the Mets jumped ahead 6 to 1 and were never seriously threatened. The Mets were lead in this game by second baseman, John Allen, 4 hits and Phil Shannahan's clutch relief pitching.

In the second game of the day, the Mets fell behind 6 to 1 after one inning of play and then played outstanding defense for the next 6 innings to defeat Cameron Steel 11 to 9. The Mets were lead by the outstanding defensive play of the Pawlowski brothers, Fran and Jim and a clutch hitting of pitcher Jack Boykin and shortstop John Kaderka.

In Sunday morning's game against Arco Steel, the Mets were a little sluggish and did not get untracked until the top of the 6th when veteran Nat Hardee's magic bat powered 2 out grand slam home run to propel the Mets from a 7 to 6 deficit to 10 to 7 lead and then held on for a 10 - 8 victory. In the final of the winners bracket the Mets ran into a little trouble in the



form of Bobby G's. The Mets lost 10 to 6 due to several clutch hits by Bobby G's.

Facing elimination in what turned out to be Houston's hottest weekend the Mets rebounded for a thrilling comeback-from-behind victory against the Houston Police Dept. #1 team trailing 16 to 12 in the top of the 7th. The Mets rallied for 12 runs. The Mets were lead by lefty Al Morrey's fine clutch hitting and outstanding defensive play in squeezing out a 24 - 22 victory.

In the finals the Mets quickly jumped on the team that beat them in the finals of the winners bracket, Bobby G's, 17 to 6 and 18 to 11 to capture the first place honors. The Mets captured 2 of the 4 additional awards, Nat Hardee, Golden Glove Infielder and John Allen for Most Valuable Player. Other team members that played all around games were Michael Slack, and ageless Wayne Whittington. The Mets are managed by Rich (Billy Martin) Holtje.

Roundup Swap Shop

Boats and Planes

Sailboat, 26' American, 1975. Main and jib, tandem trailer, all in exc cond., \$8900. 487-1476 or 474-3319 after 5.

Cars and Trucks

78 Camaro LT, exc cond., automatic, \$4999. Peacock. X2208 or 486-0154.

79 Camaro Z-28, white 2000 miles, loaded \$7295. Peacock. X2208 or 486-0154.

48 Chrysler Windsor, 2-door, exc cond. inside and out, hydramatic drive, runs good, \$1900. 486-1151 after 6.

77 Chevrolet impala, 6 cyl, 20 honest MPG, air, auto, power steering, no rust, wrecks or flooding. Haines. X3831.

69 Z/28 327, 202 heads, 11 to 1 piston, Holley, headers, good 60's and 70's, mags, body and exterior good, spoiler, high rise hood, transmission needs work, \$990 or best offer. John. 946-4827.

79 Chev. Silverado PU, take up payments. 538-1391.

78 T'Bird, 23K miles, exc cond., 16 mpg town, 302 V8, AM/FM/Tape, college bound, must sell, no equity, pickup approximately \$4300 note. Williamson. 554-2693.

Misc

Whirlpool air conditioner, 6000 BTU, \$90. Kenmore gas dryer, \$75, will demonstrate. 946-4311.

Tool box for wide bed pickup, \$75. Fiberglass canoe, \$115. Kayak, \$145. 334-1983 after 6.

Sears 48 Car battery 12V size 24C 6 7/8W X 10 1/4L X 8 5/8H. Purchased Jan 1979. Cost \$49.99, well \$30. 488-1550.

Vinyl motorcycle cover, fits large motorcycle with fairing and saddle bags, \$35. Ken X3229 or 944-6450.

Firewood, oak, you haul it, \$35 per pickup load or will sell in larger quantities. Dave Saucier. 585-5816.

Custom Savage. 22-250 rifle w/scope; Ruger Mark I .22 target pistol; single barrel 12 gauge shotgun. 534-4603 after 6.

GE built-in dishwasher (white) very clean, \$60. Tappin full size portable dishwasher (white) with cherry cutting board top, \$75. Marlow. X3863 or 333-3154 after 5.

Family membership in Windemere Racquet & Swim Club (Bal Harbour). Dick Colonna. X3937.

Empty 30# freon tanks, \$5. J. McBride. X2524 or 534-2066.

New "Cyclo-matic" auto. adj. bed w/built-in Cycle-Massage units. \$400. Maxine Hicks. X4633 or 944-5290.

Westinghouse 14 cu ft refrigerator, \$50. Hendrix. X2971 or 487-1273.

Household

Baby high chair, \$10; baby walker, \$5; bumper guard for crib, \$2. Cris. X5811 or 534-3756.

Wanted

Reasonably priced left-handed Bear Whitetail bow and almost any type of accesso-

Ads should be under 20 words, double spaced, typed or printed, one ad per person. Deadline for submitting or cancelling ads is 5:00 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-ins, please. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads. Goods or services must be offered as advertised without regard to race, religion, sex, or national origin.

ries for Bear bow. Bradley. X6486.

Boys bike and girls bike, 26" or 27" single or 3-speed, Marlow. X3863 or 333-3154 after 5.

Pets

AKC Lhasa Apso puppies, golden lion coloring, males and females, ideal pet for children. McBarron. 474-4663.

Carpools

Carpool from Bayridge Apartments to JSC on 8-4:30 shift. Contact Teresa Thomas. X6471 or 334-2475.

Would like to form carpool from Stafford-Missouri City area to JSC via Almeda-Genoa Rd. Sally MacArthur. X5554.

Need ride from Bellaire Meyerland area to JSC, 7:30 or 8 to 4:30 or 5. Joe Peacock. X6326.

Stereos

Pioneer KH-5151 compact stereo AM/FM/Cassettes, phono, with 2 speakers, exc cond., \$200. 333-2916.

Musical Instruments

Hammond M-100 organ w/bench, rhythm and various special sound section, fruitwood finish, \$600. Sears exercycle, \$40. Jones. X3803.

What's cookin' in the JSC cafeteria

Week of August 13 - 17

MONDAY: Chicken & Rice Soup; Texas Hots & Beans; BBQ Ham Steak; Steak Parmesan; Beef & Macaroni (Special); Green Beans; Carrots; Au Gratin Potato. Standard Daily Items: Roast Beef; Baked Ham; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

TUESDAY: Tomato Soup; Potato Baked Chicken; BBQ Spare Ribs; Mexican Dinner (Special); Squash; Ranch Beans; Spanish Rice; Broccoli.

WEDNESDAY: Clam Chowder; Baked Turbot; Liver & Onions; BBQ Ham Steak; Baked Meatloaf w/creole sauce (Special); Beets; Brussels Sprouts; Green Beans; Whipped Potatoes.

THURSDAY: Beef & Barley Soup; Chicken & Dumplings; Corned Beef w/cabbage; Smothered Steak w/cornbread dressing (Special); Spinach; Cabbage; Cauliflower au gratin; Parsley Potato.

FRIDAY: Seafood Gumbo; Pork Chop w/Yam Rosette; Creole Baked Cod; Tuna & Salmon Croquette (Special); Brussels Sprouts; Green Beans; Buttered Corn; Whipped Potatoes.

Week of August 20 - 24

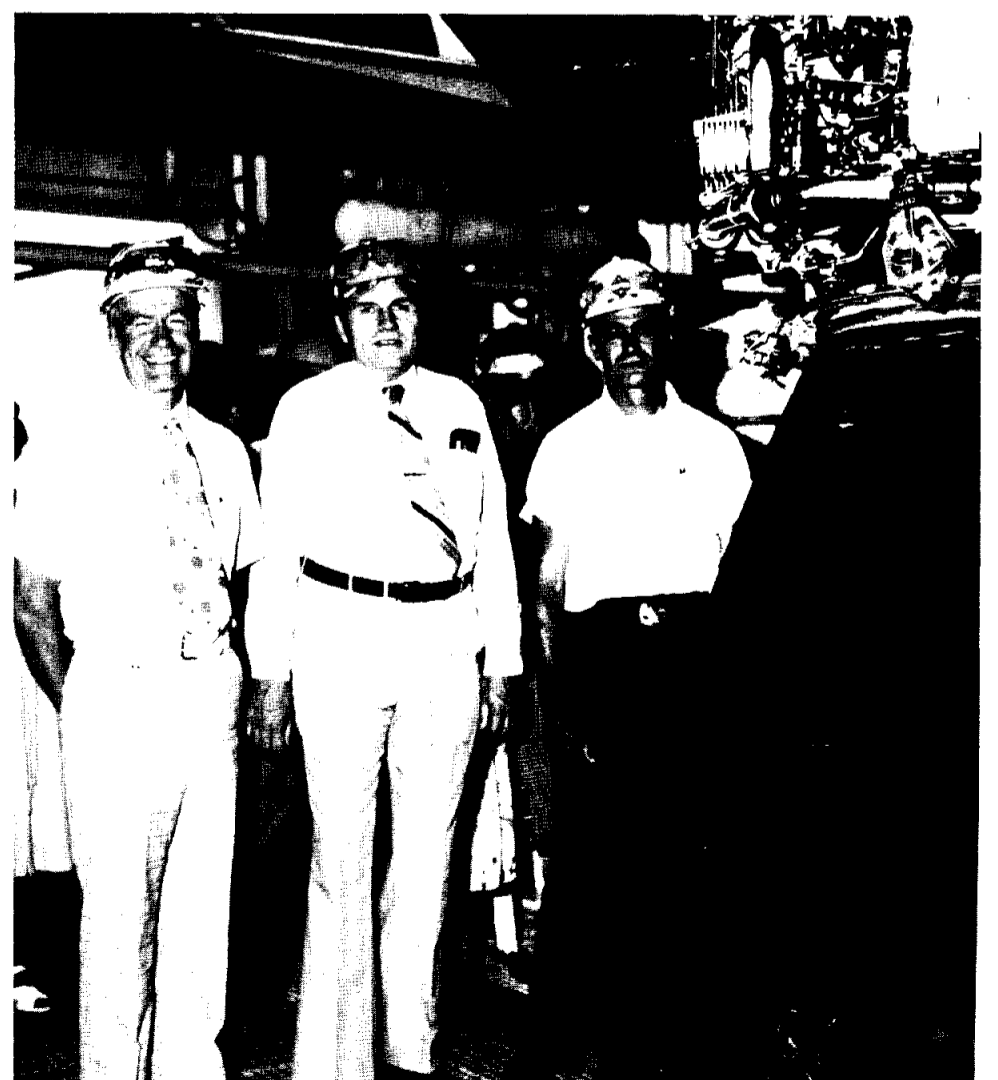
MONDAY: Cream of Celery Soup; Braised Beef Ribs; Chicken a la King; Enchiladas w/chili; Italian Outlet (Special); Brussels Sprouts; Navy Beans. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

TUESDAY: Beef & Barley Soup; Turkey & Dressing; Country Style Steak; Beef Ravioli; Stuffed Cabbage (Special); Corn Cobette; Okra & Tomatoes; French Beans.

WEDNESDAY: Clam Chowder; Catfish w/hush puppies; Roast Pork w/dressing; 8 oz T-Bone Steak; Chinese Pepper Steak (Special); Broccoli; Macaroni w/cheese; Stewed Tomatoes.

THURSDAY: Cream of Tomato Soup; Beef Tacos; BBQ Ham Slice; Hungarian Goulash; Chicken Fried Steak (Special); Spinach; Pinto Beans; Beets.

FRIDAY: Seafood Gumbo; Liver w/onions; Deviled Crabs; Roast Beef w/dressing; Seafood Platter; Tuna & Noodle Casserole (Special); Whipped Potatoes; Peas; Cauliflower.



New Mexico Governor Bruce King recently paid a visit to JSC's White Sands Test Facility. On the left is the facility manager, Jesse Jones, and flanking the governor on the right is the Orbital Maneuvering System test article and propulsion test office chief Rob Tillett. The OMS test article was set up on test stand 403, inside one of two vacuum chambers at the site. The vacuum chambers are evacuated by a steam generator powered by three X-15 rocket engines.

Bulletin Board

Please limit announcements to
10 lines, double-spaced copy

Peter Glaser to Address Symposium

NASA and contractor employees are invited to attend the symposium and luncheon sponsored by the NASA/ASEE Faculty Fellowship Program. The symposium will be held Wednesday, August 15 at the Gilruth Recreation Center. Luncheon speaker is Dr. Peter Glaser, vice-president for science and engineering of Arthur D. Little, and inventor of the solar power satellite concept. For more information on the luncheon call Patricia Pan or Joanne Davidson at 740 749-4408. For more information on the symposium contact co-chairman C. J. Huang, chemical engineering department, University of Houston, 749-4407.

EAA Reps Have Alley Theatre Order Forms

Season tickets are again available for next year's five performances at the Alley Theatre for the low price of \$24.50. See your EAS rep or bulletin board for an Alley Theatre brochure which contains an order form for subscribers. Enclose a check or indicate a charge plan, and send it to Doris Wood, EF-1 (x-2161). Your check will be cashed or charge card billed in September. Coupon books will be home-mailed just prior to the opening of the '79-80 season in October.



Eagle Landers Reunite

The recent tenth anniversary celebration for Apollo 11 included a reunion for the Lunar Module Systems group, FC4. The picnic was held on July 21, Saturday, at the Galveston County Park, League City, and was open to those who worked at least one LM or EMU mission from Apollo 5 through Apollo 17. Those who attended (and if from out of town, from where) are listed below.

William Bates, Lawrence Bourgeois, Robert Carlton, Jervy Conwell, Frank Edelin, William Fink, Vincent Fleming (Covina, CA), Fred Frere, Charles Gruby, James Hannigan, Robert Heselmeyer, Carroll Hopkins (Alamogordo, NM), E. L. Keesler, ary.

Fredrick Keune, Jack Knight, Robert Legler, Edwin Marzano (Torrance, CA), Merlin Merritt, Larry Minter, Harold Moore, Robert Nance, James Nelson, Milton Neubauer (Newport News, VA), Henry Otten, Hershel Perkins, William Peters, Donald Puddy, James A. Saultz, Harry Smith (Laurel, MD), Darrell Stamper, Larry Strimple, William Sturm, Richard Thorson, Glenn Watkins, Wolfgang Weber (St. Claire Shores, MI), John Wegener, Fredrick Wentland (Bowie, MD), Charles Whitmore, David Whittle, Lee Wible, Donna Daugherty, Marilyn Garzon, Maxine Kitay (Stuart, FL), and Katherine Spencer.

To all those who attended the picnic/reunion, happy annivers-

Marshall Skylab Team Returns from Australia



Editors Note: Joe Jones is the Public Affairs Officer for the Marshall Space Flight Center and accompanied the Skylab investigation team on their trip to Australia. The following is a personal report on the trip.

By J. M. Jones

Four Marshall employees returned from Australia last week with an improved understanding of the final moments of Skylab, and brought with them a few fragments of the late spacecraft which had been gathered from the beaches, wheat fields and sheep paddocks of Western Australia.

The four had left Huntsville late July 13, two days after the rugged space laboratory lost its struggle with gravity, ending up as a midnight spectacular as singular as had been its mission.

Citizens across 600 miles of Western Australia had seen the brilliant breakup of the 77-ton space machine over the Indian Ocean. While much of it fell into the ocean, some of the heavier pieces travelled inland and fell harmlessly in a path that turned out to be about 20 miles wide and several hundred long.

NASA wanted to learn more perfectly the dimensions of that path, the condition and the precise location of the debris — to learn this through interviews with eyewitnesses and with those who had found the remains. It was also desirable, secondarily, to get small samples of various materials to see what effects long-term exposure (more than six years) had had on certain materials.

Representing NASA on this trip were Dr. Ray Gause, whose interest was materials; Billy Adair, electronics equipment and trajectory specialist; William Harrison, structures specialist, and J. M. Jones, public affairs. We were joined in Los Angeles by Robert Grey of the State Department, who had handled the international aspects of the Skylab reentry problem. Grey had also recently lived in Australia and thus knew it well.

Stopping first in Canberra, the federal capital, we conferred with the U. S. ambassador to Australia, Walter Alston. We then met with and began laying plans with officials of the ministries of Science and Environment as well as Defense. A representative of those agencies would accompany us to the western regions where Skylab fell.

Also in Canberra we held two of several press conferences. The media, as was the citizenry, was much interested in this unusual visit. We made it plain on every such occasion that we really weren't there to collect Skylab hardware — that it was "finders keepers" — that our purpose was to learn about the dispersion pattern. Any small pieces that owners would release to us for scientific study would be returned happily, along with appropriate certification of authenticity.

In Perth, we were received by the premier of the state of Western Australia.

Our ten-man party, including a motion picture photographer engaged in Perth, hired two twin Cessnas and left for the coastal town of Esperance. There the State Emergency Services group, a volunteer organization akin to our rescue squads, had earlier put out the word (most helpfully) that we were coming and that citizens should turn in their collected debris. In that group's shed there were neatly laid out on a concrete floor about 30 numbered specimens, most of them apparently really Skylab. Each had been cataloged as to where it was found and by whom. We took pictures and samples, interviewed many of the finders and in some cases visited the site of the find. This was a splendid volunteer group, and

the attitude of the citizens at large was just as great.

Upon our arrival, the president of the shire (county) had arranged a mock ceremony in which an officer of the parks service ticketed NASA for littering, the evidence having been found all about the country-side. The townspeople gave us a reception that night, and the program included the performance by third-graders of a newly-written Skylab song, sang to the tune of "Froggie Went a Courtin'."

Apart from Skylab business, there were other pleasant social interludes, including visits to wheat farms and sheep stations of a few thousand to tens of thousands of acres, and meals in the homes of gracious people.



From Esperance we went several hundred miles inland to the communities of Coolgardie, Balladonia and Rawliana, and the city of Kalgoorlie.

Coolgardie and Kalgoorlie belong to the gold-field region of West Australia, where many a fortune was found and dug late in the last century and early in this, and where one gold mine still operates.

In Coolgardie one shop-keeper was trying to strike it rich through the public display of a portion of a Skylab water tank, at a dollar for adults and fifty cents for children. We photographed it, without charge.

At Kalgoorlie we encountered a second almost-complete oxygen tank, a companion to one displayed at Perth. Both had been found near the rail town of Rawliana, a community of 80 people who live and maintain rail tracks on the Nullarbor Plain. We later visited this little rail settlement, whose nearest neighbor in one direction is 240 miles, and the other

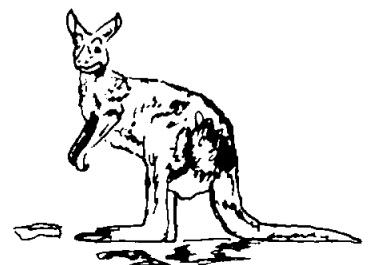
700 miles. (We were delighted to be met at Rawliana's dirt landing strip by 8 or 10 elementary-level children on the back of a pickup truck singing Stephen Foster's "Oh Susanna" and seeming to relish particularly the line "I come from Alabama . . .")

The people of Rawliana, as elsewhere, were friendly and helpful, and had us in their homes for coffee and tea.

At Rawliana, we were deep toward the end of Skylab's "footprint." The heavier pieces, yet unfound, would be up there, we concluded, no farther than the 28th parallel. With little chance of finding the "needle in the haystack," we nevertheless flew our light planes at 1,000 feet along the track for the range of remaining fuel, perhaps coming within 30 or 40 miles of the end of the footprint. The vegetation was sparse (supporting, it was said, 1 sheep for every 30 acres), but we saw nothing and concluded the remaining hardware would not likely be found except through the mustering of sheep, or the deliberate criss-crossing of helicopters in a pattern. Searching for the pieces was really not our business, but we couldn't resist a small go at it.

Our purpose achieved, we returned to Perth to wind up our 12-day visit by completing some interviews and other documentation efforts. Two of our number came home through Canberra, to tell the federal ministries of the results and to thank them for the extraordinary assistance and friendliness they had shown.

Post Script: A final Skylab reactivation and reentry report is expected to be published by the second week of September.



Engines & Suit

Frosch Addresses STS Problems

Dr. Robert Frosch, in recent testimony before the Senate subcommittee on Science, Technology and Space, addressed several of the key problem areas concerning the development of the Space Transportation System. His remarks are extracted below by subject.

Space Shuttle Main Engines

"Engine testing is now proceeding at a good pace. The recent engine problem with the main oxidizer valve has been corrected by redesign and the main engines are now operating satisfactorily. Approximately 46,000 test seconds of engine operation of the 80,000 planned for STS-1 certification have been accomplished. Previous main engine development problems have been overcome and residual turbine problems are now being analyzed.

"A plan to eliminate hydrogen pump

turbine blade cracking to extend operating life of the pump is underway. Changes to the engine start-up sequence to reduce temperature spikes have reduced the blade cracking incidence.

"Recent problems did cause engine deliveries for Columbia to be delayed and engine manufacturing workforces were higher than planned at the Rocketdyne plant in Canoga Park.

"Engine operation has been demonstrated to the 100 percent power level required for early Shuttle missions. Engine testing to demonstrate the 109 percent power level planned for later Shuttle missions is now scheduled for FY 1980. It is anticipated that further design improvement to components of the turbopumps and combustion devices may be required to obtain this higher performance level and to increase the engine operating life.

Kennedy Space Center Facilities

"All facilities at KSC are complete and in place for the first manned orbital flight. Although ground support equipment and the computerized launch processing installations have been delayed, they are in the final stages of completion and software validation is in process. Because software and computers utilized for launch operations fell behind schedule early this year, additional personnel have been required. Simulation support is continuing for development of checkout procedures, and checkout software is now being developed and validated.

Astronaut Suit, Related Items

"The astronaut suit, extravehicular

mobility unit, and portable oxygen system have experienced cost growth and schedule delays. The original Hamilton Standard contract estimates were optimistic and have been significantly affected by vendor cost escalation and delays. Both subsystems use concepts new to spaceflight application for the purpose of long term operational advantages, and several costly design changes have been required during development. The increased number of astronauts, requiring some small size suits, has made it necessary to increase the number of sizes of EMU components and therefore increased our cost and schedule estimates. A recent EMU failure during astronaut training exercises in the watertank at JSC has further delayed this effort and added an additional cost.

Funding Augmentation Rationale

"The requirement for the FY 1980 budget amendment arises from the cumulative impact of problems encountered in main engine testing, installation of thermal protection on the orbiter and external tank, qualification testing of orbiter systems and other development activities. The \$220 million is requested to augment the \$610.5 million for Design, Development, Test and Evaluation included in the basic FY 1980 budget request. With the augmented amount, we expect to be able to conduct the first orbital flight test, to continue ground testing, to verify system life and performance and to continue a series of orbital flight tests leading to an operational capability in early 1981."

NASA Gives 5-Year Plan

Continued from page 1

1985 comet intercept mission. The low-thrust system, teamed with an inertial upper stage could deliver 50,000 pounds to synchronous orbit, compared to 5,000 for the IUS alone.

— Satellite services equipment would be developed throughout the 1980's, including effectors for the remote manipulator system, astronaut EVA tools, and pressurized cabins or service busses attached to the RMS end for human operators.

— Power Extension Package would begin development in FY 1981 for use in 1983 Shuttle missions requiring higher power or longer staytimes.

— 25 Kilowatt power module development would start in FY 1981 for a first use in 1984. It would be a free-flyer and could extend Shuttle staytime up to 60 days.

— Materials Experimentation Carrier and MEC II would start development in FY 1982 and FY 1983 for availability in 1984, 1987 for the more advanced MEC II. Both would support space processing experiments. MEC would use power from the 25 KW power module. MEC II isn't well defined yet and would depend on experiments performed on MEC and their evaluation.

— Large Space Structures Systems Engineering would start in FY 1981 for demonstrations in space beginning in 1984. The program would develop tools, materials, and techniques for orbital assembly of the first generation of large space structures.

— Large Geostationary Platform would be started in FY 1982 for launch in 1988 as the synchronous orbit platform for a wide variety of payloads including weather and earth resources and observation systems, science and communications devices.

— Space Power Systems Engineering would start in FY 1984 for use in 1987 and is viewed as the next step past the 25KW power module. It would provide up to 500 KW for materials processing, space construction and other applications.

— Tethered Satellite System development would start in FY 1981 for use in 1983 to deploy a subsatellite from the orbiter cargo bay into the upper atmosphere and retrieve it at the end of the mission. The subsatellite would be reeled out on a line up to 100 kilometers long.

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Editor this issue - Chas. Redmond



EOD's Ravet Gets Honors From USDA Unit

The Department of Agriculture recently honored JSC earth resources employee Frances W. Ravet with a commendation citing Ravet's outstanding contribution in supporting the USDA's Crop Condition Assessment Division, located in the Agena building.

Ravet worked with the USDA division during the extent of the Large Area Crop Inventory Experiment and during the transition period for the establishment of an operational USDA unit here at JSC.

The Crop Condition Assessment Division, headed by Jimmy Murphy, provides the USDA Foreign Agriculture Service with information concerning world-wide crop stress. This information is derived from Landsat and meteorological satellite data and programs written, in part, by Ravet.

Presenting the award for the USDA was the assistant administrator of the Foreign Agriculture Service, Turner Oyloe. The commendation is signed by Thomas Hughes, administrator of the FAS.

The Crop Condition Assessment Division is the first step in the USDA's long-term goal of being able to provide automated satellite assessments of world-wide crop conditions.

Move Set For Lunar Samples

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Eighty-eight percent of the 842 pound's worth of lunar returned samples are pristine. There is still one-third of the core tube samples which have not been examined, either.

The new building provides a much larger and coherent storage facility, better and more efficient laboratory and processing facilities, and a feature which was completely lacking in the old facility — a public viewing area with walkways leading to the processing section.

Samples are presently stored in Building 31 curatorial facility, in remote vaults in Buildings 1, 45, and 16, and at the Brooks Air Force Base, San Antonio. The Building 31, 1, 45, and 16 sample collections will be consolidated in the new laboratory. The Brooks collection, representing a cross-section of all lunar sample material, and containing 14 percent of the total collection, will remain as a remote storage facility. The remote facility applies the "don't put all your eggs in one basket" philosophy.

Actual transfer of the dispersed samples and the cabinets in Building 31 to the Building 31A lab will begin in about a week. The new lab is presently being scrubbed clean. It will be cleaner from contaminants than any present facility except the Brooks vault.

The new facility marks the real coming-of-age for the study of extraterrestrial material, and is another addition to the long list of NASA's unique facilities.



"What, No white brocade vest?"