



ROUNDUP

NASA LYNDON B. JOHNSON SPACE CENTER

HOUSTON, TEXAS

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"We were glad to get them off our backs"

People huddled around the television monitors could hardly detect the precise moment of touchdown when the Orbiter *Enterprise* landed on the dry lakebed runway.

And a landing that smooth is no small accomplishment with any airplane, be it a Cessna 150 or a commercial jet, much less the sophisticated *Enterprise*.

Shouts of jubilation and applause filled the air; switchboards were jammed with callers who wanted to know where and when they could buy a ticket to ride the fabulous new flying machine; engineers congratulated one another. That old "mission fever" was back at JSC with all the feelings of pride and accomplishment the moment deserved!

After all, JSC is the lead center for the Space Shuttle. It has primary responsibility for systems engineering and integration and for the development, production, and delivery of the Orbiter.

On the screen, the chase planes seemed dwarfed beside "the odd couple," as the 747-Orbiter combination has been frequently named. The entire free flight event was unbelievably smooth, even to the most scrutinizing observers. Preliminaries began with a normal takeoff — as normal as possible, that is, for two airplanes using one set of wheels! Even the separation maneuver, which requires the firing of a series of explosive bolts, failed to produce any sensation more earth-shaking than a slight upward lurch which was, according to Orbiter Commander Fred Haise "just noticeable."

In fact, the moment of separation was deemed "a little anticli-

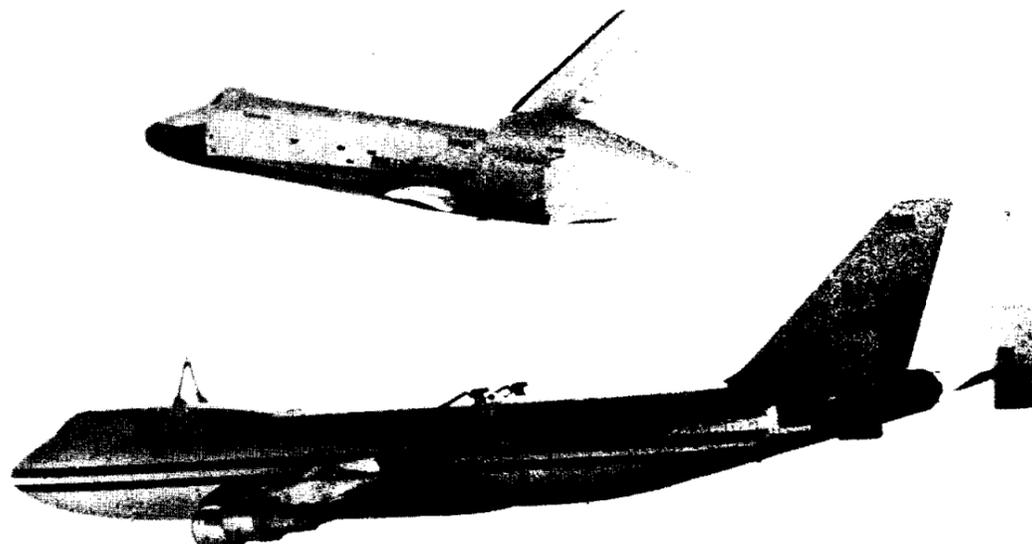
matic" by the pilots. When 747 pilot Fitzhugh (Fitz) Fulton was asked during the postflight press conference how he felt at the separation point, he quipped, "we were glad to get them off our backs," which drew a round of laughter from the news crowd.

The weather at Edwards, California, was excellent for the free flight event. Only the slightest turbulence was recorded at flight time, and the altitude climb was slightly ahead of schedule. At 23,000 feet, the climb rate dropped off above the preplanned schedule, and separation occurred at 27,000 feet.

When the flight was not described as being very close to prediction, it was said to be better than estimated. The Orbiter was described as being "too good a glider" by the *Enterprise* crew; its rudder control and speed brakes were judged very good. Comments about the responsiveness of the craft were repeated many times. Floating (buoyancy) tendencies were not as pronounced as they had been in simulation flights, which helped to make the smooth landing that was accomplished.

Even so, there were a few minor problems with the communications system, an auxiliary power unit (APU), and one computer.

The communications problem was solved with safety precautions built into the system which allowed all parties in communication with the craft to be cut off except those absolutely necessary to the flight. A leak in the APU was thought possible according to ground teams, but a leak was not confirmed in flight.



SEPARATION POINT — Gene Edmonds, JSC, shot this photo at separation.

The importance of performing simulations and incorporating redundant systems into the spacecraft was emphasized by the failure of one of the five onboard computers. Donald (Deke) Slayton, manager of the Approach and Landing Program Office at JSC, told newsmen at the press conference that the purpose of simulations is to think about problems that could occur in actual flight and prepare for them. During these dress rehearsals, failures, malfunctions, and obstacles are input to the pilots who must deal with them as though they were in flight, and the simulated flights sound very much like the real thing.

Slayton said that computer failure was one such simulated problem. Because this possibility had been addressed in simulation, the failure of the number 2 primary computer caused no particular concern on the free flight. The other four computers built into the system simply continued the required

duties.

Simulation exercises and system redundancy were named by Slayton as two possible causes for what might be interpreted as a lack of excitement during modern space missions as compared to the early days of spaceflight. So many potential problems and difficulties are foreseen and rehearsed that even the critical ones encountered in flight may seem old hat to veteran flight and ground control teams.

One local news commentator speculated that perhaps this feeling of nonurgency on the part of the crew and ground control teams is unconsciously transmitted to the public instead of the tense apprehension of earlier days, which the public interpreted as excitement. The overall effect might be judged as good or bad — good because everyone has confidence that each mission has been well planned and that all events are always under control; bad because, as Slayton

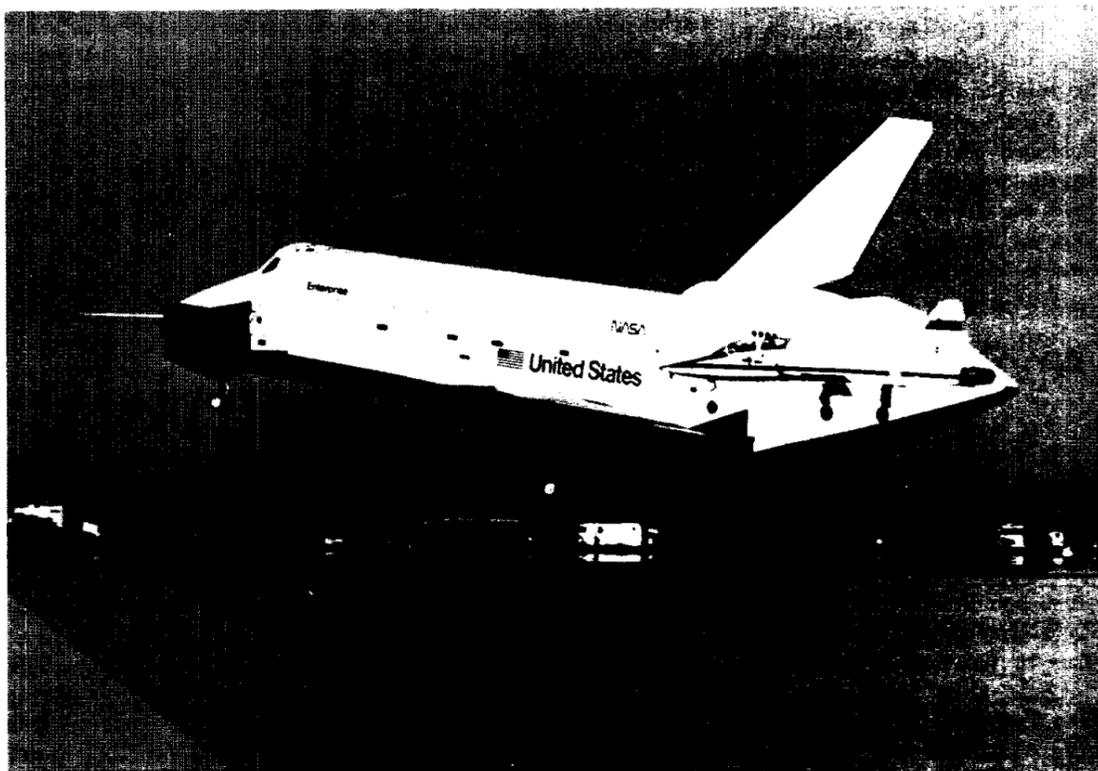
implied, some may feel that the old excitement is gone.

In the Space Shuttle program, however, it would seem that the everything-under-control ideal is a good one.

With the Space Shuttle, spaceflight is to become commonplace. Space will be a place where specific projects can be undertaken for the benefit of mankind. The Space Age is to take on a new dimension; it is not to be relegated only to glorified performances and feats of derring-do. Missions may be dedicated to research, to problem-solving, to examining the wealth of knowledge held in the universe.

In this light, this first free flight might be properly described in the words of Sen. Barry Goldwater: "the second most important flight in history."

Asked what he thought of the Senator's statement, Slayton replied, "I wouldn't disagree with the Senator on that!"



MISSION ACCOMPLISHED! — Astronauts Haise and Fullerton (left photo) smile following a super-smooth landing (right photo).

JSC welcomes second 20 astronaut applicants

The second group of 20 Space Shuttle astronaut applicants to be selected for individual interviews and physical examinations reported to JSC Monday, Aug. 15. Like the first group, these applicants are also pilots.

The names, birthplaces (BP), and current duty stations (DS) of the second group selected for further screening are:

Lt. Col. Leslie B. Anderson, III, 36, USAF; BP - Wooster, Ohio; DS - 436th Tactical Fighter Training Squadron, Holloman AFB, N. Mex.

Capt. Richard S. Couch, 31, USAF; BP - Hamilton, Ontario, Canada; DS - 4950th Test Wing, Wright-Patterson AFB, Ohio.

Maj. Richard O. Covey, 31, USAF; BP - Fayetteville, Ark.; DS - AFFTC, Detachment 2, Eglin AFB, Fla.

Capt. Dale S. Elliott, 32, USAF; BP - Lake Charles, La.; DS - 3246th Test Wing, Eglin AFB, Fla.

Lt. Robert L. Gibson, 30, USN; BP - Cooperstown, N. Y.; DS - Strike Aircraft Test Directorate Fighter Branch, Naval Air Test Center, Patuxent River, Md.

Capt. Ronald J. Grabe, 32, USAF; BP - New York, N. Y.; DS - USAF/RAF Exchange Program, Amesbury, Wiltshire, England.

Stanley D. Griggs, 37, Civilian; BP - Portland, Ore.; DS - CC52/Johnson Space Center, Houston, Tex.

Maj. James G. Hart, 35, USMC; BP - Minneapolis, Minn.; DS - Air Test & Evaluation Squadron 5, Naval Air Facility, China Lake, Calif.

Lt. Cmdr. William B. Hayden, 32, USN; BP - Oakland, Calif.; DS - Fighter Squadron 14, Naval Air Station Oceana, Virginia Beach, Va.

Lt. David T. Hunter, 29, USN; BP - Tacoma Park, Md.; DS - Strike Aircraft Test Directorate, Naval Air Test Center, Patuxent River, Md.

Maj. Jack M. Jannarone, 34, USAF; BP - Ft. Gordon, Ga.; DS - 6512th Test Squadron/DOTF, Fighter Branch, Edwards AFB, Calif.

Maj. Don E. Kenne, 35, USAF; BP - Baltimore, Md.; DS - 475th Test Squadron, Air Defense Weapons Center, Tyndall AFB, Fla.

Capt. Kerry E. Killebrew, 30, USAF; BP - Murray, Ky.; DS - 6512th Test Squadron/DOTF, Fighter Branch, Edwards AFB, Calif.

Maj. James R. Klein, 35, USAF; BP - Dubuque, Iowa; DS - USAF Test Pilot School, Edwards AFB, Calif.

Lt. Joseph F. Lucey, 31, USN; BP - Minneapolis, Minn.; DS - Strike Aircraft Test Directorate Fighter Branch, Naval Air Test Center, Patuxent River, Md.

Lt. Cmdr. John M. Luecke, 33, USN; BP - Macomb, Ill.; DS - Box 84, COM NAV ACTS UK, FPO, N. Y.

Lt. Cmdr. Jon A. McBride, 33, USN; BP - Charlestown, W. Va.; DS - Air Test & Evaluation Squadron 4, Point Mugu, Calif.

Lt. Cmdr. Charles R. McRae, 33, USN; BP - Miami, Fla.; DS - Strike Aircraft Test Directorate, Naval Air Test Center, Patuxent River, Md.

Capt. Michael D. Marks, 34, USAF; BP - Salt Lake City, Utah; DS - Air Force Flight Test Center/DOVA, Edwards AFB, Calif.

Capt. Marvin L. Martin, 30, USAF; BP - Nevada, Mo.; DS - USAF Test Pilot School, Edwards AFB, Calif.



ASTRONAUT INTERVIEWS BEGIN - These first potential additions to the American space corps since 1969 were welcomed by officials here Tuesday, Aug. 12. They were praised as being among "the finest group of people the country's got

to offer in terms of ability, experience, and physique." Addressing the 20 candidate astronauts is Director of Flight Operations George Abbey, right.



Cheryl Bouillion

Cheryl Bouillion gets CPS first time around

Cheryl Bouillion just passed all six parts of the difficult two-day CPS examination in one fell swoop, and she is very happy about it. Cheryl is secretary to George Abbey, Director of Flight Operations. Cheryl refers to her position as "the most exciting directorate to work for at the Center!"

The Certified Professional Secretary (CPS) is a rating awarded by the Institute for Certifying Secretaries to a qualified secretary who successfully completes the six parts of the CPS exam. These parts consist of Financial Analysis and Mathematics of Business, Environmental Relationships, Business Law and Public Policy, Economics of Management, Communication and Decision Making, and Office Procedures.

The examination is given once a year at various colleges and universities throughout the country. When at least one part of the exam is passed, the applicant may retake and pass the parts failed within a five-year time limit to receive the CPS rating. Only rarely does a person pass all the parts at one time.

Cheryl studied eight months for the CPS exam by taking a review course sponsored by the National Secretaries Association (NSA) at the University of Houston at Clear Lake City. Tuition for the review course is reimbursable by NASA. Costs that the secretary must bear include a \$30 application fee and a \$60 examination fee (\$30 if a member of NSA).

Cheryl says she feels "very fortunate to have passed this examination the first time out, as I understand only 18 percent of those all over the world pass it the first time they try."

Want to start an NSI group?

"Chip" Armstrong, new administrative aide of the National Space Institute (NSI), invites correspondence from individuals who are interested in launching NSI chapters, clubs, or other local units.

Mr. Armstrong is ready to provide lists of members in any locality and/or will publish in the NSI Newsletter the names and addresses of those who wish to take the lead in forming new groups.

The NSI will help with programming and can send information on special topics, lists of audiovisual materials to borrow, and names of potential speakers in each area of the country.

For more information, contact the NSI at 1911 N. Fort Meyer Dr., Suite 408, Arlington, Va. 22209.

Kathryn Forsyth named Co-op of the month

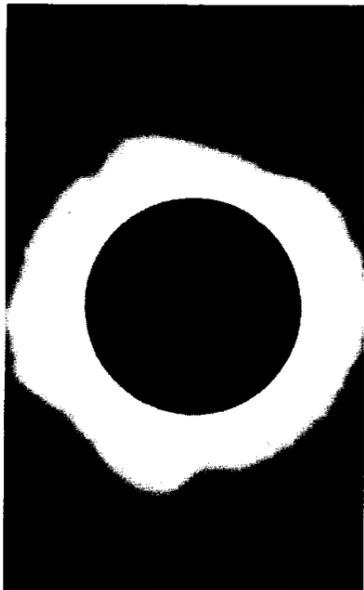
During her third work period in the Mission Operations Branch of the Flight Control Division, Miss Forsyth was assigned to the ALT Program where she performed her tasks with a minimum of supervision. She worked with senior engineers in technique development, data generation, flight design, and real-time mission preparation.

Among Miss Forsyth's primary responsibilities were the development of tools and techniques to measure and predict wind velocities so that the ALT trajectories could be shaped and the drop points established. She developed a desktop computer program that incorporates the effects of measured winds in a planned trajectory for the purpose of evaluating required profile

modifications. She was also instrumental in developing and verifying the techniques used in wind biasing the ALT free flight profiles.

In assisting in the preparations for integrated simulations and flight tests, Miss Forsyth translated desired flight profiles into trajectories consistent with day-of-flight meteorological conditions, which involves computations of ground speeds, bank angles, and ground tracks, and plotting these data on plot boards used in the Mission Control Center.

The excellent attitude and competence displayed by Miss Forsyth has gained for her not only the Coop of the Month award, but also the respect of the senior engineers with whom she worked.



SOLAR BLACKOUT - This photograph shows a typical solar eclipse. It was taken in 1973.

On Oct. 12, a total eclipse of the Sun will be visible from Colombia, South America. The JSC Astronomical Society is planning an excursion to view and photograph this rare and awe-inspiring phenomenon as part of a one-week trip from Houston. Thousands of Colombians will have the day off as a national holiday (Columbus Day) and are expected to jam the roads. Joining them will be amateur and professional astronomers from all over the world.

For a bargain price of \$520, which includes airfare, first class hotels, and sightseeing tours, the trip departs from Houston Oct. 9. Spend 4 days in Bogota, the capital city, and 3 days at the beach resort of Cartagena. For further information, contact Paul Maley, X6457 before August 31.

Apollo ISA elects new officers

The local section of the Instrument Society of America (ISA) elected a new slate of officers for 1977-78: president, Dr. Zafar Taqvi; vice president, P. D. Taylor; president-elect, Joe Canniff; treasurer, Bob Bronson; and secretary, Herb Hannwood. The other members of the Executive Committee include Mike Suraci, newsletter editor; Charlie Coe, national delegate; Dave Smith, division liaison; Gabe Fajardo, publicity chairman; and members Dr. Harish Dhingra

and Al Neumann.

The ISA is a technical, scientific, and educational organization dedicated to enhancing the capabilities of men and women involved with the design, manufacture, and use of instrumentation, computers, and systems. The local ISA section provides the forum where industrial problems are identified, discussed, and dealt with on a unified basis. Anyone desiring further information about the ISA should contact Joe Canniff, X2391.



ROUNDUP

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Editor: Beverly Eakman Photographer: A. "Pat" Patnesky

ROBERT GILRUTH RECREATION FACILITY

Fall Classes

All applicants must sign up at the Gilruth Recreation Center (X-3594). Payment must accompany registration. This money is refunded only in extreme situations.

AUTO MECHANICS

Basic or Beginners Class: Three 2-hr lecture classes, One 2-hr lab session. Covers routine and periodic maintenance, engine theory and operation, and basic discussion of drive train and accessories.

Sign-up deadline: 8-25-77; classes start: 9-1-77
Meet Thurs. night: 7:15-9:15 p.m., room 204
Fee: \$16.75 per person and parts for lab session

Intermediate Class: Four 2-hr lecture classes, three 2-hr labs. Covers electrical system theory and maintenance procedures, fuel system theory and maintenance, running gear and drive train, and a section on trouble shooting.

Sign-up deadline: 10-20-77; classes start: 10-27-77
Meet Thurs. nights: 7:15-9:15 p.m., room 204
Lab meets Oct. 29, Nov. 5, 12
Fee: \$33.50 per person and parts for labs

OIL PAINTING

Lois Miller will be the instructor of two beginner oil painting classes this fall. Each student will paint at least one complete painting covering all phases from materials selection to the finished product. Six 2-hr classes.

Sign-up deadline: 9-1-77; classes start 9-8-77
Meet Thurs. nights 6-8 p.m., room 215

- or -

Sign-up deadline: 10-27-77; classes start 11-3-77
Meet Thurs. nights 6-8 p.m., room 215
Fees: Either course \$37.50 per person and materials

PLANT PROPAGATION

Another local NASA talent, Richard Bricker, will be instructing a class in plant propagation dealing with species for use in the Houston area. The course will cover plant selection, care, and propagation. Seeds, cuttings, and other materials will be provided. Two sessions will be offered as follows (five 2-hr classes):

Sign-up deadline: 9-1-77; classes start, 9-8-77
Meet Thursday, 7:30-9:30 p.m., room 214

- or -

Sign-up deadline: 10-13-77
Classes start: 10-20-77
Fees: Either course \$14.50 per person

PHOTOGRAPHIC DARK ROOM

Local photographer, Don Halter (home phone 488-0588), will give instruction in black and white dark-room techniques for the beginner just starting his own developing. Eight 2-hr lab and lecture classes.

Sign-up deadline: 9-6-77; classes start 9-13-77
Meets Tuesday nights, 7-9 p.m., room 213
Fee: \$25.00 per person, darkroom supplies included

GROUP TENNIS LESSONS

Jim Grubbs will instruct either beginners or intermediates in groups of 4 to 8 people. Eight 1-hr sessions.

Sign-up deadline: 8-31-77; classes start 9-6-77
Meet Tues and Thurs. nights.
Beginners, 7:30-8:30 p.m.; intermediates, 8:45-9:45 p.m.

- or -

Sign-up deadline: 10-4-77
Classes start: 10-11-77
Meet Tues. and Thurs. nights.
Beginners, 7:30-8:30 p.m.; intermediates, 8:45-9:45 p.m.
Fees: Either session, \$30.00 per person

LANGUAGES

French, German or Spanish in three 8-hr sessions. Audiovisual language instruction with almost total emphasis on understanding and speaking, using basic expressions in the language, interacting in everyday situations, and understanding some of the cultural aspects of those who are native speakers. Writing and formal study of grammar are not included. Instructors are all experienced secondary school language teachers who have spent a great deal of time in the countries where the language is spoken.

Sign-up deadline: 9-19-77 (all languages)
Spanish classes start: 9-26-77; meet Monday nights, 6:30-9:30 p.m.
(Note: On two Mon. holidays, class will meet on Wed. for that week.)
German and French classes start: 9-28-77; meet Wed. nights, 6:30-9:30 p.m.
Fees: \$40 per person (Students may supply own cassette recorder with one blank 60-min. tape. This is not an absolute requirement, but instructor will make taped lessons for you if it is provided.)

EAA ATTRACTIONS

TICKETS

The following tickets are available at the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday - Friday.

Astroworld - Adult & children tickets available for \$6.95 each. That's a \$1 discount.

Dean Goss Dinner Theater - Comedy production, *Not with My Daughter*. Tickets \$16/couple available for any night except Monday, Saturday through Sept. 3.

Disney Magic Kingdom Club - Free membership cards.

Sea-Arama Marineworld - Tickets on sale, \$3.75 for adults, \$2.50 for children. Open until dusk, year round.

Six Flags - Adult & children tickets \$6.75 each. That's a \$1.20 discount.

JSC MEN'S BOWLING LEAGUE

The organizational meeting for the 1977-78 JSC Men's Bowling League is scheduled for Aug. 22, 1977, at 5 p.m. in the Gilruth Recreation Center, Room 215. Team captains or their representatives and any interested employees are invited to attend or call Jack Kochner at X-3271 for further information.

DEFENSIVE DRIVING

The EAA will be offering its next defensive driving course Sept. 26-29 from 6-10 p.m. at the Gilruth Recreation Center.

Registration, still a long way off, is scheduled for Sept. 19-20 from 10:30 a.m. to 1:30 p.m. in the center lobby.

ATHLETIC RESERVATIONS

For any type of athletic reservations, employees should call Tim Kincaid at X-3954 after 3 p.m.

DANCE CLASSES

The JSC Dance Club will sponsor a 10-week series of classes every Wednesday evening beginning Sept. 7 at the Gilruth Recreation Center. All types of dancing (Latin, waltz, rock, polka, fox trot, etc.) will be taught by instructors Bob and Rae Calvert of Calvert Dance Studios. Cost is \$38 per couple for the session. To register, call Dance Club secretary Billie Fairfax, X3050.

EAA ACTIVITY CARDS

For JSC employees, EAA activity cards are issued at the employee's exchange office in building 11. Contractor employees may obtain their EAA cards at the Recreation Center.

SUMMER LEAGUE FINALS

- A League Champions: Blazers - Coach Pawlowski
- B League Champions: Dudes - Coach Jim Porter
- B League 2nd place: Rats - Coach Larry Davis
- C League Champions: Heat - Barney Hudson

WEEK OF AUGUST 22 - 26

MONDAY: Cream of Celery Soup; Braised Beef Ribs; Chicken Ala King; Enchiladas w/chili; Italian Cutlet (Special); Brussel Sprouts; Navy Beans; Selection of Salads, Sandwiches and Pies Daily.

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

WEDNESDAY: Catfish w/hush puppies;



Seafood Gumbo; Roast Pork w/dressing; 8 oz T Bone Steak; BBQ Plate; 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; Devilled Crabs; Roast Beef w/dressing; Seafood Platter; Tuna & Noodle Casserole (Special); Whipped Potatoes; Peas; Cauliflower.

AUGUST 29th TO SEPT 2nd

MONDAY: French Onion Soup; Beef

Chop Suey; Polish Sausage; German Potato Salad; Breaded Veal Cutlet (Special); Okra & Tomatoes; Green Peas. Selection of Salads, Sandwiches and Pies Daily.

TUESDAY: Split Pea Soup; Shrimp Creole; Salisbury Steak; 8 oz. T Bone Steak; Fried Chicken (Special); Mixed Vegetables; Beets.

WEDNESDAY: Vegetable Soup; Fried Catfish w/hush puppies; Braised Beef Ribs; BBQ Plate; Weiners & Beans; Shrimp Salad; Stuffed Bell Pepper (Special); Corn O'Brian; Italian Green Beans; Rice.

THURSDAY: Chicken Noodle Soup; Beef Stroganoff; Turkey & Dressing; BBQ Smoked Link (Special); Lima Beans; Buttered Squash; Spanish Rice.

FRIDAY: Seafood Gumbo; Broiled Flounder; Liver w/onions; Seafood Platter; Fried Shrimp; Meat Sauce & Spaghetti (Special); Green Beans; Buttered Broccoli; Whipped Potatoes.

CARS & TRUCKS

72 Cadillac Coupe de Ville. XInt cond, AM-FM stereo tape, leather, cruise control, vinyl top, new tires, 57K mi, etc. \$2,500. Patterson, X-3238 or 488-0813.

65 Chevy Impala sta wgn. 1 owner, good motor & tires. \$300. Johnson, 474-3588 after 5.

71 Plym Brougham sta wgn. Auto, pwr, dual air, 40/60 bench seat, 3 seat, 383 V-8, good cond. \$1,275. Lauritzen, 944-3615.

71 Datsun PL510 4-dr sedan. Std trans, A/C, stereo, radials. Mitchell, X-4601 or 946-7011.

Racing cart. XInt cond, many spares. Offer. Siler, X-5630 or X-6121.

72 VW bus. XInt cond. \$2,195. Sampsel, 471-0172.

72 Pont Luxury LeMans. 2-dr HT, 350-V-8, pwr steer & windows, bukt seats, console, new radials, tilt wheel, A/C, xInt cond. \$2,275. Coan, 488-1028.

71 Buick Electra Ltd. 4 dr, A/C, all pwr, vinyl top, good cond. \$1,195. Black, X-3606.

73 Cadillac Sedan Seville. Fully loaded, new tires, xInt cond, 29K mi. Rauch, 488-6692 after 5.

67 Ford Fairlane. Bad body, good 289 engine, running gear & tires. Great beach or work car. \$275. Thompson, 332-2229.

75 Lincoln Continental. 4-dr sedan, AM/FM stereo w/tape, speed control, leather, 6-way pwr seats, pwr windows & doors, delux grouping, tilt wheel, 28,200 mi. \$400 below retail. Reina, 488-1326.

74 Chevy PU. 1/2 LWB, 36K mi, good cond. \$2,550. Kirby, 486-1740.

76 Plym. 4 dr, auto, A/C, 6-cylinder, pwr, 12K mi. Ellis, X-3048 or 686-1923.

71 gold Camaro. A/C, 4-speed, good tires, needs some body repair. below

Roundup Swap Shop

Swap Shop advertising is open to JSC federal and on-site contractor employees. Goods or services must be offered as advertised, without regard to race, religion, sex or national origin. Non-commercial personal ads should be 20 words or less, and include home telephone number. Typed or scribbled ad copy must be received by AP3/Roundup by Thursday of the week prior to publication.

wholesale. Shropshire, 482-7715 after 6.

74 Chevy Super-Cheyenne. 1/2 PU, 454 V-8, many xtras. \$3,395 (below NADA). Engel, X-3921 or 482-7830 after 6.

70 Audi 100LS. Totally rebuilt engine, interior & body. \$1,600. Kochner, X-3271 or 488-2390.

74 VW Dasher. 4 dr, auto, A/C 34K. \$2,495. Kochner, X-3271 or 488-2390.

70 Olds Delta 88. Good cond. \$750. Glover, 334-2317 after 5.

75 Dodge van. Beautifully customized inside, xInt cond. \$5,595. Foster, 944-8434.

2 black bucket seats from Dodge van. Like new. \$60 Ferguson, 482-3241.

Credit Union Repos; subject to prior sale: 76 Pont Grand Prix, \$5,300; 76 Ford sta wgn, \$4,700; 75 Nova, \$2,000; 74 Vega, \$1,100; 74 Subaru, \$1,450; 73 Olds sta wgn, \$1,300; 71 Mark 111, \$2,000; 75 Hornet, make offer; 75 550 CB Honda, \$600; 72 Ply Roadrunner, make offer. Call collection dept., 488-7070.

CYCLES

AMF, coaster break, 26" men's bike. \$35 or best offer. Massaro, X-2631, 482-5218.

76 Harley Superglide FXE cycle. Blue w/matching helmet. 4200 mi. \$2,695. Weaver, 473-6079 after 6 p.m.

Honda 350-4. \$300 or best offer.

Yahama 100. Needs work. Make offer. Shirley, 659-3118.

BOATS

76 Cobia. 16-ft charger, Chrysler 120 hp engine, big wheel trailer, walkthru V-hull, great family boat, seats 8. \$3,950. Amann, X-5376 or 333-2359 or 729-5446 evenings & weekends.

Bass boat, 77 Rough Neck 450XL. 115 HP Mercury, custom trailer, trolling motor, depth finder, xInt cond. Wong, 729-9680 after 5 or weekend.

PROPERTY & RENTALS

Lease: new 3-2-2, Sagemont area (Wood Meadow). Drapes w/fireplace, etc. \$395/mo. Molnar, 334-3202.

Sale: Islander East Condo, top floor efficiency. XInt Gulf view, balcony, tennis, beach, swim pool, furnished. Becker, 481-3397 after 6 p.m.

Rent: New Jamaica beach cottage, Galveston Island. \$175/wk. 334-1640 after 6 p.m.

Sale: Oakbrook West, 3-2-2, mastr suite w/fireplace, living, den, dining, studv, 2225 sq. ft. Blucker, 488-4188.

Rent: Garage in Nassau Bay area. Larry, X-4941 or 333-2640.

Rent: Beach house. Reserve for summer vacation now. Jamaica Beach, new 2-story. \$175/wk. 334-1640 after 5 p.m.

Rent: Vacation retreat at Cape Royale, Lake Livingston. Tennis, pool, boat launch, golf, fishing. Three-day minimum. Nolte, X-2181.

Galveston West End. 2 BR By-the-Sea condo apt, full furn. \$180/wk off season, \$260/wk in season. Clements, 474-2622.

MISCELLANEOUS

New front door for house. \$45. New hollow core interior door. \$5. Bartash, 333-3690 after 5:30.

71 edition World Book Encyclopedia w/year bks thru 1975. \$150. National Geographic July 1970 thru Dec. 1973. \$150. Lynch, 487-5595.

MUSICAL INSTRUMENTS

Yamaha trombone w/case. Good cond. \$75. Welty, 333-3071.

Yamaha piano. Perfect cond w/ practice pedal. Tuned and serviced regularly. \$1,250. Lockard, 488-8007.

PETS

Kittens: 2 short-haired alley kittens need homes. Grey male, grey & white female, 6 wks. Rainey, X-5348 or 474-2988.

Kittens: Seal Point Siamese. \$20 each. Huber, X-5800 or 554-2992.

HOUSEHOLD ARTICLES

Large Spanish armoire (chest on chest). \$15. Guillory, 488-2652.

LOST & FOUND

Black umbrella. Did someone borrow one from the tech library and forget to return? Reid, X-4049.

WANTED

Used refrigerator. Good cond. Wenzel, 482-7073.

Car pool from Texas City. Join or form, Young, X-4949 (8-4:30) or 948-3804.

Riders for carpool from W Loop, SW Fwy. Bellaire area. McLaughlin, X-5536 (8-4:30) or 661-2974.

Firefighters needed. Clear Lake City male and female adult residents. Rewarding community service. You will be trained and equipped. CLC Volunteer Fire Dept., 488-0023 anytime.

LATE ENTRIES

76 Granada. \$3,600. Handley, X-2271 or 482-7041.

Camping trailer, tent type. Camel "Dunes." \$250. Handley, X-2271 or 482-7041.

70 Torino sta wgn. Good cond, V-8, A/C pwr steer, radio. \$750. Norris, X-5437 or 488-2276.

Bach B flat trumpet, lacquer finish, xInt cond. \$150. Lee, 946-3907 or Verby, X-5861.

115V GE window unit air cond, 5000 BTU. Has had little use. \$75. Verby, X-5861 or 946-3907.

4 G-78 X 15, 4+2 polyglas tires, 3 fair, 1 shot. Make offer. Massaro, X-2631, 482-5218.

Orbiter piggyback concept not really new

The *Enterprise*-Boeing 747 combination is by no means the first composite rig in aviation history.

Midway through World War I, the British experimented with a Bristol Scout perched atop a Felixstowe three-engine flying boat. The idea was to get the Scout airborne and to release it at altitude for intercepting and attacking the Kaiser's Zeppelin bombers over England.

The stack flew once May 17, 1916. Release was successful and both aircraft landed, but the experiment was not repeated or pursued.

Two decades later, the British

developed the Short-Mayo composite as a means of getting a heavily loaded seaplane airborne. The "mother" flying boat, called *Maia*, carried the smaller seaplane, *Mercury*, on a pylon (a support structure) and made the first separation flight Feb. 6, 1938. In July of that year, the twosome flew nonstop from Foynes, Ireland, to Montreal with a load of mail and newspapers.

Composite aircraft configurations were used as weapons by the Luftwaffe during the Allied invasion of France in mid-1944. The composite usually consisted of an unmanned Junkers 88 loaded with explosives and a Messerschmitt 109

or Focke-Wulf 190 mounted on a pylon. The fighter pilot would fly the combination toward a target, separate, and hope to fly away before the Junkers 88 impacted.

The Soviet Union also dabbled in piggyback airplanes in the thirties. The Link composite consisted of two Sukhoi I-4's that were rolled up ramps onto each wing of a Tupolev TB-1 bomber.

Closer to home, the U.S. Air Force and NACA — the predecessor of NASA — experimented with what might be called "piggybelly" composites. Some of these were research aircraft, such as the Bell X-1 and X-2, the Douglas D-558-2, and

the North American X-15. Others were experimental fighters, such as the McDonnell XF-85 Goblin.

In the 1950's, the Air Force fitted a squadron of Convair B-36 bombers with skyhooks for launching and retrieving Republic RF-84F fighters. But as the emphasis shifted toward extending fighter range, the program was phased out by the end of the decade.

Today, the "world's largest biplane" offers a practical approach toward solving problems in flight test and logistics. Early planning for moving Shuttle Orbiters from the factory on the West Coast to the launch at Kennedy Space Center (KSC) involved strap-on jet engine packs for flying Orbiters like airplanes in several hops for the 3000 miles.

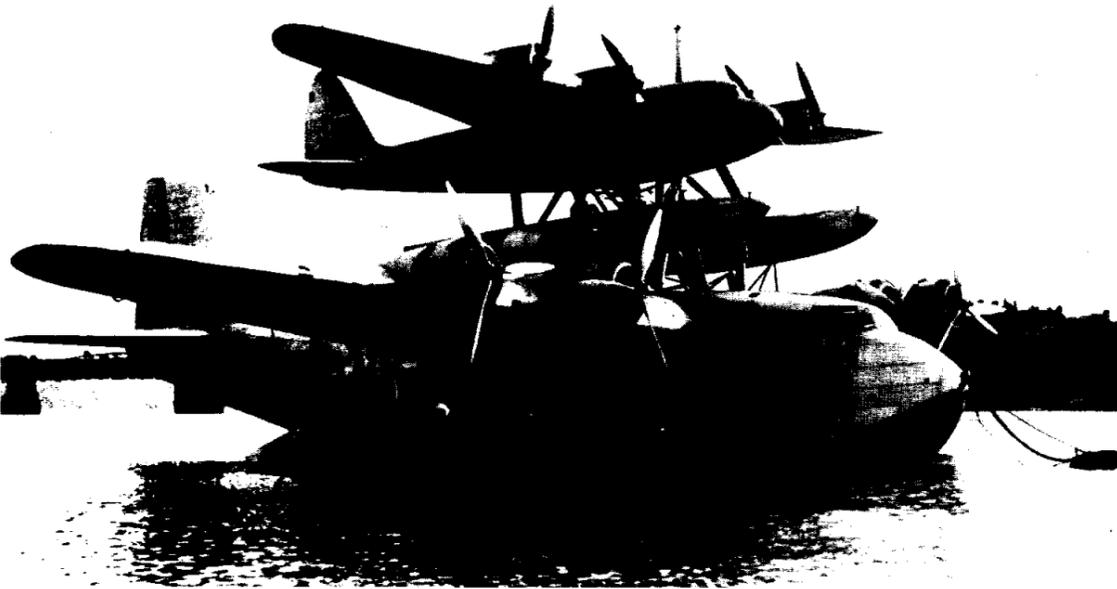
Problems of trying to make a part-time airplane out of a full-time spacecraft forced a new approach. Enough jet fuel had to be loaded

for a cross-country ferry flight.

Spacecraft design engineer John Kiker at JSC resurrected the piggyback concept as a way to ferry Orbiters from coast to coast and as a means of launching an Orbiter for atmospheric tests of the landing system and handling characteristics for those brief minutes when an Orbiter becomes an airplane.

Many aircraft carriers were considered and then discarded as too costly or impractical for the job until the Orbiter-747 combination was settled on as the most feasible idea.

The NASA 905, as the ferry craft is designated, will still have a job after the approach and landing tests are completed. It will carry the *Enterprise* to the Marshall Space Flight Center at Huntsville, Alabama, for vibration tests next year and from the Dryden Center to KSC for the orbital flight tests in 1979.



SHORT-MAYO COMPOSITE — The two four-engine aircraft actually made numerous composite flights with separations, including a record-setting flight from Dundie, Scotland,

to the Orange River in South Africa — a 5,997-mile record which still stands. *Maia* was destroyed by a Luftwaffe bomb May 11, 1941, while moored in an English harbor.

On the chance that someone is out there, NASA has approved the placement of a phonograph record on each of two planetary spacecraft being readied for launch next month to the outer reaches of the solar system and beyond.

The recording, called "Sounds of Earth," was assembled by a group of prominent scientists and educators and placed Friday, July 29, aboard the first of two Voyager spacecraft scheduled to be launched to Jupiter and Saturn.

The 12-inch copper disk contains greetings from Earth people in 60 languages, samples of music from different cultures and eras, and natural sounds of surf, wind and thunder, and birds, whales, and other animals.

The record also contains electronic information that an advanced technological civilization could convert into diagrams, pictures and printed words, including messages from President Carter and Secretary General Kurt Waldheim.

The messages on the record were designed to enable possible extraterrestrial civilizations who might intercept the spacecraft millions of years hence to put together some picture of 20th century Earth and its inhabitants.

"Because space is very empty, there is essentially no chance that Voyager will enter the planetary system of another star," said astronomer Carl Sagan of Cornell University. "The spacecraft will be encountered and the record played only if there are advanced spacefaring civilizations in interstellar space.

Sagan added "the launching of this bottle into the cosmic ocean says something very hopeful about life on this planet."

The idea for the record was formulated by Sagan and the repertoire was selected by an advisory committee of prominent scientists, musicians and others. Sagan also was responsible for the plaques with a message previously sent into interstellar space aboard the Pioneer 10 and 11 spacecraft.

A phonograph record was chosen because it can carry much more information in the same space than for example, the Pioneer plaques. In addition, 1977 is the 100th anniversary of the invention of the phonograph record by Thomas Alva Edison.

Each record is made of copper and is in an aluminum protective jacket. It contains, in scientific language, information on how the record is to be played, using the cartridge and needle provided. The record begins with 115 photographs and diagrams in analog form, depicting mathematics, chemistry, geology, and biology of the Earth, photographs of human beings of many countries, and some hint of the richness of our civilization. Included are schematics about the solar system, its dimensions and location in the Milky Way Galaxy, descriptions of DNA and human chromosomes, photographs of Earth, the Voyager launch vehicle, a large radio telescope and human beings in various settings and endeavors.

This is followed by spoken greet-

ings in approximately 60 human languages.

The Voyager record next includes a sound essay on the evolution of the planet Earth, including sounds of weather and surf, the Earth before life, life before Man, and finally the development of human civilization.

The musical selections, which run to almost 90 minutes playing time, are representative of the cultural diversity of Earth, of many times and places, and include both Eastern and Western classical music and a variety of ethnic music. Included is music from Senegal, Australia, Peru, Bulgaria, and Azerbaijan, as well as jazz and rock and roll. In the classical repertoire are compositions by Bach, Beethoven, Mozart, and Stravinsky, as well as Javanese Gamelan, Indian Raga, Japanese Skakuhachi, and Chinese Ch'in music. The entire 16 2/3-rpm record runs nearly two hours.

Because of the aluminum cover and the emptiness of interstellar space, the record is likely to survive more than a billion years. Thus it represents not only a message into space but also a message into time.

JSC taxis help handicapped

In line with the Center's efforts to support a very successful hiring program for handicapped individuals, the Transportation Branch has agreed to continue use of the JSC Taxi Service for those handicapped persons unable to board the Shuttle buses that are typically used to transport employees at onsite loca-

tions.

If you are physically unable to ride the Shuttle bus, including temporary handicaps such as a broken leg, call Shirley Price, X-3734, so that your name can be added to the list of persons permitted to use the taxi service within the Center complex.

Shuttle extends man's Earth-bound senses

The dream to lift man's eyes above their terrestrial cataracts is coming true since NASA awarded its latest space telescope contracts.

The 2.4-meter (8-foot)-diameter telescope, capable of accommodating up to five different instruments at its focal plane, will be placed in orbit in late 1983 by the Space Shuttle.

The module will enclose the optical telescope and scientific instruments and provide all interfaces with the Shuttle Orbiter.

The high-resolution optical telescope system will permit astronomers to investigate problems relating to the structure, origin, evolution, and energy balance in the universe — observations that could never be made below the veil of the Earth atmosphere.

By using the Space Shuttle, the useful operational lifetime of the space telescope will be extended to a decade or more.

At the same time, in an unrelated project, NASA awarded a contract to build a super-cooled telescope for the Infrared Astronomy Laboratory (IRAS).

The IRAS is a cooperative U.S.-Netherlands space project to perform an infrared survey of the entire celestial sphere. The satellite consists of a spacecraft to be provided by the Netherlands and a large, cryogenically cooled infrared telescope to be provided by the United States. Integration of the two systems will be made in the Netherlands.

The telescope mirror, although modest by terrestrial standards, is expected to perform 10 times better than the one at the Hale Observatory on Mt. Palomar.

Meanwhile, scientists and engineers at the Marshall Space Flight Center are working with their heads in the clouds to improve the quality of weather prediction. They are at work on an atmospheric cloud physics laboratory (Cloud Lab), which would fly twice a year for 10 years aboard the Spacelab.

The 400-kilometer (890-pound) Cloud Lab will occupy a double experiment rack within the Spacelab pressurized module. Most of the equipment consists of environmental control devices for three different cloud chambers. Scientists are trying to escape the force of gravity, which makes everything in a cloud chamber settle before a physicist can take any useful measurements.

The problem with weather prediction today is that it deals with a variety of scales. Predictions are based on various mathematical models, none of which can really take into account what happens inside clouds. Yet, what clouds do to hundreds of square kilometers is dependent on what begins on a scale smaller than a pinpoint.

One Cloud Lab chamber will permit at least 100 seconds of undisturbed observation. Scientists will be looking at forces that cannot be observed under the force of gravity.

To search for the unexpected is the reason the Cloud Lab is being placed aboard a manned vehicle rather than flown piecemeal aboard sounding rockets that offer several minutes of low-gravity at less expense. For example, no one is really sure why silver iodide causes rain. Answers to that and other questions might affect major decisions such as the establishment of pollution standards.