

# ROUNDUP

Lyndon B. Johnson  
Space Center

NASA

September 19, 1980 Houston, Texas

Vol. 19, No. 19

## Frosch, Yardley cover new space technology in STS development

The first in a series of briefings on the Space Shuttle took place at Headquarters last week—the topic: "Technological Innovation in the Design and Development of the Space Shuttle."

NASA Administrator Robert Frosch and Associate Administrator for Space Transportation Systems John Yardley conducted the briefing, the purpose of which was to provide a "background and informative review as we prepare for the Shuttle launch next March," Frosch said.

Next briefing will take place at Johnson Space Center Wednesday September 24 at 1 p.m. to cover "Onboard Data Processing in the New Generation of Piloted Spacecraft."

Frosch opened the session by reviewing the history of the Shuttle, then Yardley spoke on new spaceflight technology that has

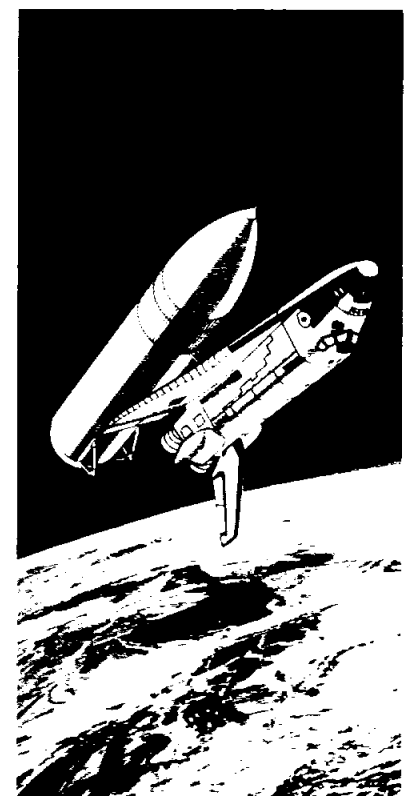
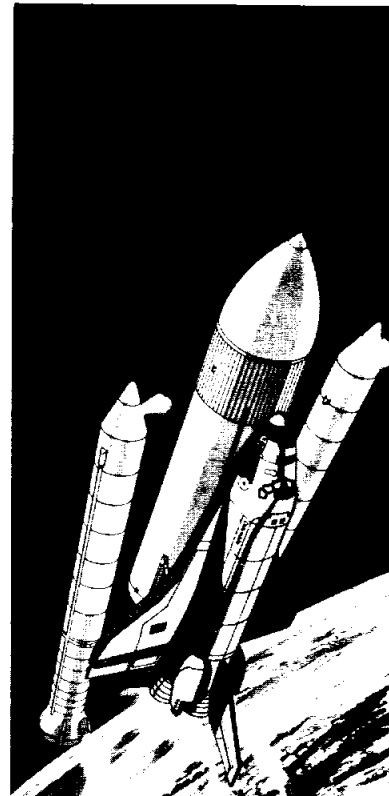
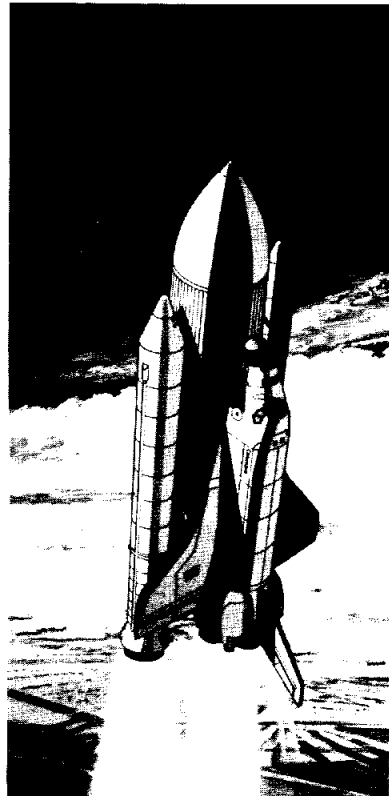
come about with the development of the Space Transportation System.

"The authority to proceed was issued in 1972," Frosch said.

"We did the assembly and work on Orbiter 101, then the first captive flight and landing test in '77. We have been assembling 102—expect it to roll out in November of this year and expect the first manned orbital flight by the end of March with an initial operational capability after the test flights at the end of '82.

"The next orbiter is coming in '82-83, with the first Vandenberg launch to come in '84. It will be the end of '84 before we have all of the elements of the system—four orbiters, both launch sites—available for a full operating system."

Frosch then restated the objectives of the Shuttle program: "To



provide a national system of space transportation which has the feature of economy, and perhaps more important, features of flexibility that we have never had available. The system can be built on and built around to become more flexible and more capable."

In regard to pricing Frosch said, "In comparing a Delta class payload in '78 dollars with the projected cost of that payload on Shuttle, we charge by the length or weight used for Delta payloads. The governing factor is generally going to be the length of the payload bay for the Shuttle. It will depend on whether the cargo can be put in a vertical position where it takes up a minimal length of the payload bay or whether it's got to be inclined or laid down. That varies the cost somewhat."

(The payload bay is 15 feet in

diameter by 60 feet long. It can take 55,000 pounds into a 150 mile eastward orbit.)

Frosch then spoke on improvements to be made in the future. "The second orbiter will be lighter than the first, therefore capable of a higher cargo payload. We have plans to remove a considerable amount of weight from the external tanks. The first flight has ejection seats, a weight penalty which will be gone after the early test flights.

"The later orbiters will be sufficiently lighter. Then we will reach full capability.

"In many cases we are volume limited more than weight limited. Most of the time it is fitting in the various packages that limits what you can do on a particular flight rather than total weight.

"In summary the drive is for

flexibility and a system that we can build upon."

Yardley then took the microphone and went into details on technological advancements that have come about as a result of Shuttle development.

"We have in the program, but not complete yet, what we call Payload Bay Kits which is additional Orbital Maneuvering System (OMS) tankage. We can put them in the payload bay and feed the system so that it can go as high as 2500 feet per second.

"Our first planned usage of this kit will be to boost the Space Telescope to its operating orbit.

"Another item that's new that we have to depend on is the hydrazine auxiliary power unit. We power our control surfaces, engines, gimbaling, engine

*Please turn to page 4*

## Space Shuttle Update

Work on the orbiter *Columbia* continues at a pace that keeps the Shuttle program on schedule for rollout from the Orbiter Processing Facility at the Cape November 23.

The third and final Crew Equipment Interface Test (CEIT) was completed early this month at the Cape, with Astronauts John Young and Bob Crippen, the first *Columbia* flight crew, along with backups Joe Engle and Dick Truly, verifying tasks and procedures that will take place during the first Shuttle mission next March.

Orbiter checkout should be completed in November, as major work on the vehicle has been completed.

Remaining is re-installation of the Orbital Maneuvering System (OMS) pods. Tests earlier this year in the JSC acoustic chamber (Building 49) showed that the OMS pods needed structural strengthening as an upgrading measure due to an increased load prediction. The pods house the 6000 pounds of thrust OMS engine and the 12 primary Reaction Control System engines.

The OMS pod test articles were retested in August in the JSC facility. The OMS pods should be back on the *Columbia* the second week of October.

During the CEIT the crews followed procedures tailored to the flight checklist. They performed functional on-orbit activities with the onboard equipment, modifying procedures as necessary to take into consideration the one-G environment of the CEIT.

One portion of the CEIT included use of the COAS (Crew Optical Alignment Sight) to determine that the payload bay door latches were secure. The COAS, installed in the aft section of the

flight deck, targets the center line of the door to ensure there are no distortions which would prohibit opening and closing of the doors.

Final closeout inspection of the orbiter is scheduled for completion by November 21. "Then all that's left is to jack down the wheels and put her on her toes and she'll be ready for rollout," a Shuttle spokesman said.

Meanwhile testing of the main engines continues at the Rocketdyne facility in California and the National Space Technology Laboratory in Michoud, Mississippi. Last week a 300-second test of Engine 0007, configured to resemble Engine 0006 which failed in a test in July, was successfully conducted at Rocketdyne.

The next static main propulsion test article firing will be November 1 at NSTL.

Thermal protection tile installation continues to run ahead of schedule; the week ending September 12 Cape workers installed

*Please turn to page 4*

**7 YEARS AGO** the crew of *Skylab 3* returned from their 59-day mission, which went from July 28 to September 25, 1973. They are shown here with recovery personnel who wore face masks to avoid exposing the crew to disease. From left to right, the three, Jack Lousma, Owen Garriott, and Alan Bean continue to be active in the astronaut program at JSC.

## 56-hour sim to run here next week

Another 56-hour simulation of the first Space Shuttle mission will take place September 23, 24, and 25 at JSC. The "B" crew, Astronauts Joe Engle and Dick Truly, will work in the fixed based simulator the first two days, and use the motion based simulator the third day for the entry portion.

Flight controllers in Mission Control Center will work with the astronauts responding to anomalies fed into the system by crew trainers in the control center and Building Five which houses the simulators.

The sim will cover procedures from launch to landing of the mis-

sion which is scheduled to take place March of next year.

The air and ground crews will pick up the count at 7:51 a.m. CDT, or T minus nine minutes, with launch scheduled for 8 a.m. the 23rd. Landing is scheduled for 4 p.m. CDT on the 25th.



# INSPECTOR GENERAL HOTLINE

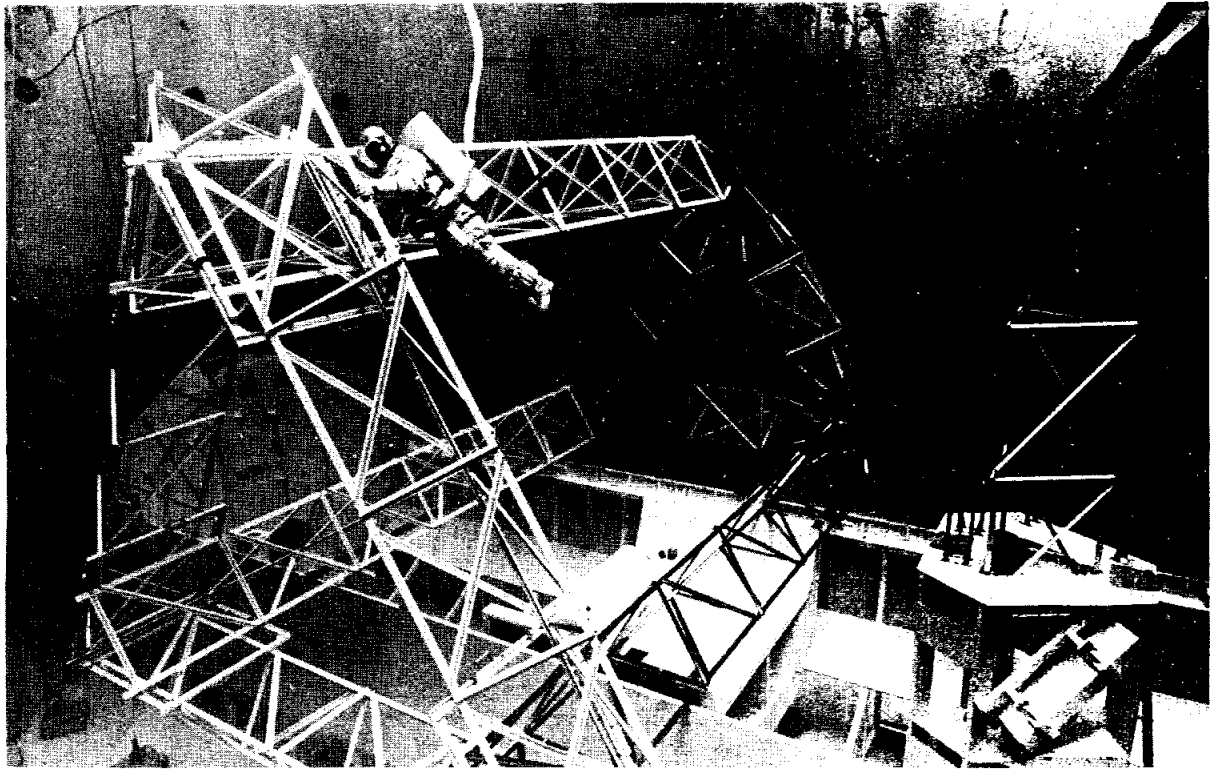
INFORMATION IS CONFIDENTIAL

- FRAUD
- WASTE
- ABUSE
- MISMANAGEMENT

AT JOHNSON SPACE CENTER CALL: 483-4773  
OR TOLL FREE: (800) 424-9183  
24 HOUR ANSWERING SERVICE

**CALLER CAN BE ANONYMOUS**

OR WRITE: **NASA INSPECTOR GENERAL**  
P. O. BOX 23089  
**NASA** L'ENFANT PLAZA STATION  
WASHINGTON, D.C. 20024



**USING BEAMS SPUN** out of spools of aluminum, a space-suited engineer assembles a triangular prism in "weightless" conditions underwater at Marshall Space Flight Center. Astronauts may use such a beam machine carried aboard the Space Shuttle to assemble large structures in orbit in the future. In this test the engineer is taking beams from a simulated beam machine in a Shuttle cargo bay and assembling them.

## Rec Center continues its new classes

**Scuba Class** - the Gilruth Rec Center will offer a six-week basic Scuba Class beginning Tuesday, September 30. The course, taught by the JSC Scuba Club, will include lectures on Tuesdays 6:30-9 p.m. and pool time on Wednesday 8-10:30 p.m. Students who successfully complete the course will be certified by NAUI. Cost is \$72 per person, which includes text book, pool fee, and use of tanks. Students must furnish their own fins, mask, snorkel, vest, and weights.

**Defensive Driving** - an opportunity to learn the art of safe driving and qualify for a 10% reduction in your auto insurance for the next three years. Class meets Saturday, September 27, 8 a.m.-5 p.m.

**Dancercise** - an exciting new addition to our schedule — part dance, part exercise, all fun. Class meets on Tuesdays and Thursdays 5:15-6:15 p.m. for six weeks beginning October 7. Cost is \$20 per person.

**Hatha Yoga** - learn to relax, reduce stress and tension, and feel better all over. Class begins Monday, September 23, 5:15-6:45 p.m. and cost is \$20 for six weeks.

**Basic Auto Mechanics** - a chance to learn a valuable skill and save money at the same time. Class meets on Thursdays beginning September 25 for three weeks. Class is on Saturday, October 4. Cost is \$16.75 per person.

**Women's Exercise Class** - a chance to get into shape and stay that way. This class is for the serious exerciser. Cost is \$12 per month and it meets on Tuesdays and Thursdays 5:15-6:15 p.m.

**OTHER NEWS** - Men's Fall Classic Softball Tourney: registration is now being accepted for the final softball tourney of the season. Tourney will be held October 3, 4, and 5. Cost is \$60 per team.

Fear of making mistakes is the biggest barrier to making progress.

## Cookin' in the cafeteria

Week of September 22 - 26

Week of September 29 — October 3, 1980

**Monday:** Cream of Chicken Soup; Beef Burgandy over Noodles; Fried Chicken; BBQ Sausage Link; Hamburger Steak (Special); Buttered Corn; Carrots; Green Beans. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

**Tuesday:** Beef Noodle Soup; Baked Meatloaf; Liver w/Onions; BBQ Spare Ribs; Turkey & Dressing (Special); Spanish Rice; Broccoli; Buttered Squash.

**Wednesday:** Seafood Gumbo; Broiled Fish; Tamales w/Chili; Spanish Macaroni (Special); Ranch Beans; Beets; Parsley Potatoes.

**Thursday:** Navy Bean Soup; Beef Pot Roast; Shrimp Chop Suey; Pork Chops; Chicken Fried Steak (Special); Carrots; Cabbage; Green Beans.

**Friday:** Seafood Gumbo; Broiled Halibut; Fried Shrimp; Baked Ham; Tuna & Noodle Casserole (Special); Corn; Turnip Greens; Stewed Tomatoes.

**Monday:** Chicken Noodle Soup; Weiners & Beans; Round steak w/Hash Browns; Meatballs & Spaghetti (Special); Okra & Tomatoes; Carrots; Whipped Potatoes. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

**Tuesday:** Beef & Barley Soup; Beef Stew; Shrimp Creole; Fried Chicken (Special); Stewed Tomatoes, Mixed Vegetables, Broccoli.

**Wednesday:** Seafood Gumbo; Fried Perch; New England Dinner; Swiss Steak (Special); Italian Green Beans; Cabbage; Carrots.

**Thursday:** Cream of Chicken Soup; Turkey & Dressing; Enchiladas w/Chili; Weiners & Macaroni; Stuffed Bell Pepper (Special); Zucchini Squash; English Peas; Rice.

**Friday:** Seafood Gumbo; Baked Flounder; 1/4 Broiled Chicken w/Peach half; Salisbury Steak (Special); Cauliflower au Gratin; Mixed Vegetables; Whipped Potatoes; Buttered Cabbage.

## Afraid to speak in public?

In a recent survey almost half the persons questioned listed speaking in public as their number one fear—outranking even the fear of death by a two-to-one margin.

Unfortunately, Toastmasters cannot do anything about fear of death, but they can help you conquer perhaps YOUR Number One fear. They CAN help you become the "supersuccessful" person you

have always wanted to be. So help yourself by taking that giant step across the threshold of fear by visiting the Spaceland TM Club.

They meet the first and third Wednesday of each month at 11:30 a.m. at Franco's (Flying Pizza), 1101 NASA Road One.

For further information call Steve Jacobs at X3561 or Emmit Fisher at x3278.

## Golfers keep on putting

The rains came with a vengeance at the tournament held at Brock Park on August 30. Those near the club house ran for it and stayed dry, everyone else got soaked.

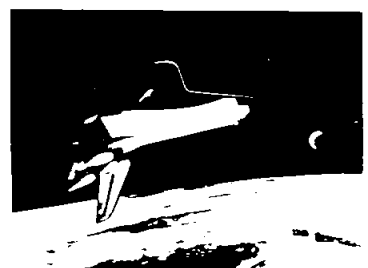
The rain forced halting the tournament at the holes completed by the last foursome in each flight. The winners in Flight I (13 holes

completed) were: **John Zombo** (net 50), **Cal Mitchell** (55), and **Rueben Taylor** (55). The winners in Flight II (nine holes) were: **Betty Gabel** (net 34), **Harry Kolkhorst** (34.5), and **Dave Price** (34.5).

The next tournament is Saturday September 20 at Texas City Bayou for all three flights.

**ASTRONAUT ANNA FISHER** uses a gun-like applicator to repair a "damaged" tile during a simulation of an extravehicular activity (EVA) in the weightless environment of the KC-135A aircraft. The applicator is a primary tool in the thermal protection system repair kit designed for use in space should a repair job be necessary before re-entry.

Roundup deadline is the first Wednesday after publication.



The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees.

Editor..... Kay Ebeling



# Bulletin Board

## Things to Watch for On PBS Channel 8

The first episode of Carl Sagan's series *Cosmos* airs Sunday September 28 at 8 p.m. Titled "The Shores of the Cosmic Ocean," the segment takes viewers on a spectacular flight through space aboard an imaginary spaceship. The viewers travel to the edge of the universe—eight billion light years away. Dr. Sagan also gives an overview of future episodes, including reconstruction of the library of Alexandria and a cosmic calendar.

On Sunday September 21 at 12:30 p.m. the series *Life Around Us* looks at "The Ultimate Machine." What effect will the computer have on human society of the future? How is it affecting us now?

## Come Hear the Houston Grand Opera

The Houston Grand Opera is offering corporate discount subscriptions to NASA employees and contractors. Obtain a special order form at the Building 11 souvenir shop. They will also be mailed with the summer catalog to Federal Business Association member. The form allows 20% off the regular subscription price or 50% off for senior citizens and students. Five operas will be presented in English in the Light Opera Series and six operas of the Grand Opera Series will be offered.

## This Theatre Offer Is Special for NASA Employees

The Nina Vance Alley Theatre Corporate Subscription Program is again being offered to NASA

employees and contractors. Season tickets are available for next year's series of six performances at the low price of \$30 which may be charged on a variety of credit cards. Brochures and order forms are available at the Building 11 souvenir shop. They will also be mailed with the summer catalog to members of the Federal Business Association. Corporate Subscription coupon books will be home-mailed just prior to the opening of the '80-81 season in October.

## Rotary Shrimporee to Take Place September 27

Once again it's time for the annual Space Center Rotary Club Shrimporee and Auction held at the County Park, Highway 3, League City. Tons of shrimp, fish, beans and slaw will be consumed along with 80 kegs of beer and soft drinks. The hi-light of the event is the auction where hundreds of items, donated by local businesses, will be auctioned off to the highest bidder. There will be automobiles, bicycles, gift certificates, boats — you name it, it will be there. Proceeds from the event will go to local charities with the Bay Area YMCA as the principal beneficiary this year.

Advance tickets are \$6, adults; \$4, children (Gate prices \$1 more) and may be purchased from Rotarians, local banks, or by calling Mario Grabar at 483-4913.

## Space Division Commander To Speak to AIAA

For its first dinner meeting of the year the American Institute of

Aeronautics and Astronautics is bringing Lieutenant General Richard C. Henry, Commander of the Space Division of the U.S. Air Force in to speak on "DOD Space—Past, Present, and Future." One AIAA source says he understands General Henry was once stationed at JSC (as Major Henry) during Gemini days.

The meeting is Tuesday September 30 at Gilruth Center; dinner reservations deadline is Friday September 26 at noon (dinner cancellations are required). Social hour is at 6, dinner at 7, and the program starts at 8. For reservations call Francie at 483-4121.

All are welcome; there is no charge for attending the program only.

## Attention, WWII Veterans

A bill was passed in Congress which will give all World War II

veterans a dividend of 65 cents per \$1000 of their GI insurance for each month of service. This is regardless of whether or not you still carry this insurance. Many veterans have not received this dividend and will not unless they request it. The Veterans' Administration urges World War II veterans to personally apply regardless of whether insurance was held or not. The VA will check for eligibility. Contact V. P. Prosser, Captain, U.S.N./ Veterans Center/ P. O. Box 8079/ Philadelphia, PA 19101.

## AIAA to Hold Joint Meeting with MIT Club

The AIAA is holding a joint meeting with the MIT Club of South Texas Monday October 6 at Gilruth Center. Dr. Paul E. Gray, President of MIT, will speak on Engineering Education at MIT. Social hour begins at 6, dinner is at 7, and the program begins at 8 p.m. Contact Marian at 483-4991

## Get a flu shot next week

Again this year the Health Clinic is giving flu vaccines.

This year the vaccine has two new strains different from last year's. It contains A/Brazil/78, A/Bangkok/79, and B/Singapore/79.

Persons 28 years and older will require only one dose. Because of lack of previous contact with prevalent strains, persons less than 28 who did not receive at least one dose of the 1978-79 or 1979-80 vaccine will require two doses of the 1980-81 vaccine. Those who received the 1978-79 or 1979-80 vaccine will require only one dose. (The two doses

should be four weeks or more apart.)

As before, high risk individuals and those who provide essential services and/or may be at increased risk of exposure through greater contact with possibly infected persons should consider taking the vaccine.

Last year there were very few reactions, all minor. However, there is a risk of more adverse reactions, so vaccinees will be asked to sign an informed consent form.

The vaccine will be given the week of September 22 from 10 to 12 a.m. and from 2 to 4 p.m.

for reservations by noon Friday October 3. All are welcome; there is no charge to attend the program only.

## JSC Bike Club to Hold 10-Mile Ride for Novice Riders

On Sunday September 21 novice cyclists can join the JSC Bike Club for a 10-mile ride. They will meet at the corner of Bay Area and Space Center Blvds. at 10 a.m. and ride to the Armand Bayou Interpretive Center and back. Call Brian Morris for details at x5293.

## Some Advice for Striking Out on Your Own

The Active Corps of Executives and the Small Business Administration will sponsor a workshop on the "Basics of Running a Small Business" at North Harris County College, 2700 W. W. Thorne, September 24 and 25 in the evening. Call 226-4945 for further information.

## On Sale at the JSC Exchange Store

(Store hours 10 a.m. to 2 p.m.)

Dean Goss tickets: \$10 single, \$20 couple (reg. \$14.50)  
ABC Theatre tickets: \$2 ea.  
General Cinema tickets: \$2.40 ea.  
Astroworld tickets: \$8 (reg. \$10.50)

Six Flags Over Texas discount tickets

Magic Kingdom Cards: Free  
Sea-Arama Marineworld Fun-

Time cards: Free

Postage stamps can now be purchased from the JSC Exchange Store in Building 11. We offer books of 20 15-cent stamps for \$3.

# Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

## Property & Rentals

Sale or Lease: Townhouse, Clear Lake City, Custom drapes, fireplace, washer/dryer, refrigerator. \$425 month. 482-6732 or 483-3532. Atkinson

LEASE: Wedgewood 3-3 1/2-2, both formals, 2-story, large family room, fireplace, fenced yard. \$475 plus deposit. 486-8578.

SALE: League City, 8-1/2% VA Assumption, new, 3-1 3/4-2, fireplace, near pool, courts, school, \$62,000. \$19,000 down. \$462/m, or rent option, 554-6200.

House for Sale/Lease: Sagemont, 4-2-2 fenced, formals, drapes, carpets, no flood, walk to schools, \$485/m, 331-9855.

For Sale: Golf, tennis, boating, fishing, country club, oversize lot at Highland Lake Estates on Lake Travis, resort community. Reasonable, Steve, x3561.

Lease: Baywind condo. 2 br., 1-1/2 b, w/d \$350/mo, \$200 deposit. No pets. Avail. October 1, 486-9305.

Galveston: Luxury high rise, oceanfront condo. Completely furnished, sleeps 6. Pool & tennis. Available by month, week, or weekend. 944-3640.

## Cars & Trucks

'77 Chevrolet Monte Carlo/Landau roof, 31,000 miles, excellent condition, new battery, ac, am-fm radio \$3,000. Michael A. Berry M.D., Hammack, 334-2303.

1975 Pinto Wagon, Auto., a/c, V-6, 52,000 miles. Very good condition. \$1550. J. B. Hammack, 334-2986.

'70 Toyota Crown Delux, 6-cyl, 4-dr, luxury and economy, Arizona car w/excellent body, paint & interior. \$1200, 212 Pecan, League City, 554-6200.

'70 VW Van, recent engine overhaul, price less than that of re-built engine. Byrns, 337-4984.

'71 Ford Pickup truck. Good condition. Call 554-2690, Glenn after 5 pm.

1976 VW Bug, new tires, battery, tune-up. 25 mpg average. Blue Book Value \$3100, will take 2400. x3734

'71 convertible Volkswagen canary yellow, black top. 42,000 miles, asking 3300. x6158 ask for Pat.

1969 Camaro. 350. 4-speed, PS/PB, Positrac. New tires, mags. Engine and trans just overhauled. \$3500. 474-4063, after 5.

## Household Articles

Refrigerator, white, exc. cond. \$165. 486-9178 or x3856. Ron.

SALE: Antique Dining Room: table, 6 chairs, buffet. Approx. 90 yrs old. \$425. Hansen x4418 or 488-8977 eves.

Litton 440 microwave oven, includes digital timer, temp probe, exc. cond. \$300.00 538-1654 after 6 p.m.

Coffee and end tables, exc. cond, \$130 or best offer. Diana x2113.

Lawn mowers \$25. Planche, x6128 or 447-2660.

## Pets

Daschund for sale, registered AKC 100. 944-2799. Kenneth Owen.

AKC Labrador Retrievers, national championship stock, shots, hips guaranteed (OFA) \$250. 333-3508.

AKC Cocker Spaniel puppies, 7-weeks old, buff color, 1 male, 1 female. Durst 471-7745 after 6 pm.

## Lost & Found

LOST: Softball glove. Sometimes it doesn't play too well, but I'd like to get it back. Has my name on it. Bob Sampson x3987.

FOUND: "Hallmark" mechanical pencil. Bldg. —1. Call Bobola x4501 and describe.

## Wanted

WANTED: Four tickets to Oilers vs Tampa Bay Oct 19. J. Bates x4601.

WANTED: Portacrib. Forbes x3394 or 488-4238.

WANTED: Housemate. male or female to share 3 bdrm house in Seabrook, W/D, 10 min. to NASA, 474-2319 eves.

## Boats & Planes

For Sale 15' Marquis, '77, 70 HP Mercury, tilt trailer, many extras. \$2795. 333-2718.

76 Gulf Coast 20 Sailboat, galvanized trailer, outboard head, 3 sails, fully equipped, exc cond. \$4500 483-4273 or 334-5778.

## Musical Instruments

Trombone, Yamaha, silver, w/case, \$150. Richard Davidson, x5545 or 946-2523.

For Sale: Trumpet, Conn w/case, exc cond. \$160. J. Bates, x5601.

## Miscellaneous

FUTURA 6 Channel Radio 72.080 frequency. Brand new, never used, still in plastic. (4) FPS 16 servos, \$230.00 471-0990 after 5.

Kirby vacuum with attachments. \$35. 485-6423.

New & in box: 23 Channel CB Radio. Call 334-5652.

Firewood: seasoned, solid, split oak, 4 x 13 foot stack \$100, you transport, 334-3544 or x2323.

25 in. RCA color TV console, radio shack with life time tubes and Sam's photo-facts manual. \$150. 488-5037.

6' farm fencing, 100 ft. w/8 steel posts, make offer. Planche/x6128 or 474-2660.

Carrier condensing unit 2.5 ton, 2 yrs old, perfect cond. \$150. Mays x5536 or 332-4184.

3 hives of bees, spare supers & frames, electric knife & 2 frame extractor. \$250. Bill Roberts x3768.

Deer rifle, Weatherby 30.06, 50 rounds, 3 to 9 powerscope, Sears Best case, \$500 firm 333-2800 after 5 pm.

Wanted: 12 to 19" BW TV-working condition, solid state preferred. Call Mark x4436 or 480-3634 after 5.

Zenith 19" color TV, portable. \$100., console stereo/ changer. Make Offer. 488-4487.

Stratolounger, exc cond. Cost \$300 will sell \$150. 488-4487.

For Sale: Disposing many years' US mint accumulation, almost all commemoratives. Only 10% above face, \$995. 482-5393 after 5 pm.

Marlin 30-30 w/Bushnell scope. \$125. 334-1983.

Eight track recorder. \$75. 334-1983.

Large wheel trailer, \$150. 334-1983.

For sale: Ladies' diamond ring, beautiful 0.8 ct. solitaire. Also girls' promise ring. Call Paul Richardson, x4205 or 337-4748.

Portable sign with letters, one year old, cost \$550, will sell for \$300. McPhillips, 337-1647.

## Cycles

'78 Honda GL 1000 motorcycle, 12,000 miles, good condition. Financing available. 474-3319.

'74 Husqvarna 360 RT for \$495, '77 Husqvarna 250 for \$595, '77 Suzuki 25 RM for \$595, also 3 bike, big wheel trailer for \$225. All excellent condition. 944-6513.

1980 Honda ATC 110, like new, in warranty, \$800. 946-7011.

For Sale: 1971 Honda M/C, good condition, \$250. x4468 or 488-3238, A. F. Smith.

Bike: Raleigh 3-speed chopper bike, a good field or dirt bike. Good shape. \$25. 488-0266.

20" Boys bike. \$20. A. F. Smith x4468 or 488-3238 after 6 pm.

Used ladies bicycle. 26" \$5 488-3276.

MAKE A BIG SPLASH



WHEN YOU SEND YOUR COST REDUCTION IDEA ON A JSC FORM 1150 TO COST REDUCTION OFFICE AT BE-3!

Cartoon by Russ Byther

'77 Dodge Van, 318 engine, regular gas, auto, air, ps/pb, stereo, two captains chairs, unfinished, 67,000 miles. \$2750. 337-5497.

1980 Chevette- 4 months old-loaded- low equity-assume-will negotiate. Bought farm truck- call 331-1779 or 925-2682 after 6 p.m.

Clean '78 Chevy PU Silverado, 8-ft stepside, dual tanks, ac/ps/pb, am/fm \$4000 or assumption plus equity. Ashley, 332-2080 (day) or 480-2694 (night).

# Frosch, Yardley speak on innovations in Shuttle program

From Page 1

valves, landing gear, and so forth with hydraulic power.

"This has been quite a development. We have now qualified our APU's for about 20 hours of operation, which will go through 15 to 20 flights, and we are hoping to do better.

"The main propulsion system has also represented quite a challenge. The entire orbiter aft fuselage is dedicated to the plumbing, valving, and so on. We had a lot of problems with this system that had to be solved.

"The engine itself was by far the largest technical challenge. Long life and reusability is a requirement that no liquid rocket engine has ever had to have before.

"We have set up the target of 55 flights for the basic engine.

"The orbiter with the three engines on the back end is not the most streamlined body you've ever seen. It's got a big, blunt back end. That means that its lift/drag ratio is low and it lands hot. If we left it with normal engine technology, that rear end would be quite a bit larger and actually getting a pliable machine would have been marginal.

"That drove us to high combustion chamber pressure. There is three to four times as high engine pressure in this engine than in any previous rocket engine.

"One of the things that we did with this engine, both to save weight and to get the high impulse, was to use a closed cycle

operation. That means we have a hydrogen pump that takes the hydrogen from the tank and pressurizes it to feed into the combustion chamber with an oxygen pump.

"Previously, rocket engines had another combustion chamber which was burning some of the propellant to drive turbines to feed the combustion chamber, and they dumped the exhaust overboard.

"Here we had to have our combustion chambers as part of the engine. We burn pre-burner on the hydrogen pump and pre-burner on the oxygen pump. We then take the exhaust gases from this pre-burner and feed them into the main burner, and we burn it all.

"Everything that comes out of the engine comes out as thrust

and that makes a significant improvement in specific impulse. It also makes it a compact, light system.

"We're operating at higher temperatures than most people did in the past, considerably hotter than, say, airplane gas turbines.

"Finally this is the first rocket engine that has ever been computer controlled. People were somewhat dubious about this in the past, but this has turned out to be a real plus. It gives us flexibility in changing mixture controls, changing start sequences and stop frequencies, and it's really been a valuable development tool.

"The use of the hardware in a closed loop engine cycle like this is a new phenomenon.

"It is a difficult task to design

and develop a lightweight, cheap external tank. We had to put a lot more hand insulation on it than we would have intended and we are looking at ways of eliminating that in the future.

"The solid rocket booster is also unusual in some senses. Its primary responsibility is reusability—we want to reuse all the hardware somewhere between 20 and 40 times. Dropping a thing this big into the water not damaging it and getting it out represents quite a challenge. We've designed for all that, and we have yet to see how successful we're going to be.

"We could spend hours on the avionics, and we will go into more detail on that at a future briefing at Johnson Space Center."

## Shuttle Update

From Page 1

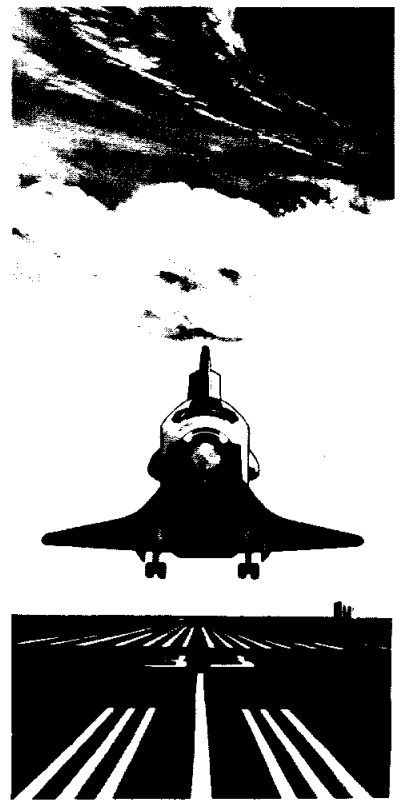
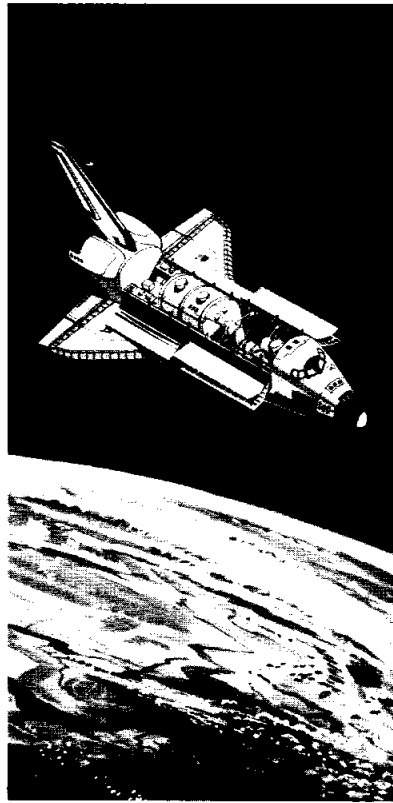
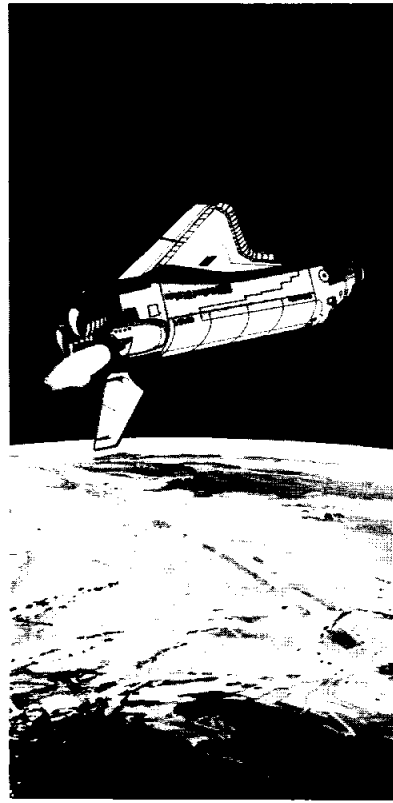
751 tiles when their goal for the week was 688.

The OMS pod modification also includes installation of new tank retention assemblies and replacement of eight propellant valve actuators.

After the OMS pods have been re-installed, a four-day structural purge test is scheduled for *Columbia* October 6 through 10.

In early October the three main Shuttle engines are scheduled to be removed for minor modifications. They will be re-installed the week of November 17.

The Dynamic Stability Test on *Columbia* late last month (see August 22, 1980, *Roundup*) ran to a successful completion in both the closed and open loop phases.



# Weather forecasting technology continues to improve

## No storm untracked since 1966; new instrument on GOES will give even more details

Every year through hurricane season JSC employees are hard put not to be distracted. Tropical depressions build into storms and head towards "hurricane alley" in the Caribbean, and Gulf Coast residents start making plans to head towards higher ground.

The hour-by-hour latitude and longitude reports are taken for granted, but it is technology developed by the space program in the past 20 years that keeps Houston informed so that should 150 mile per hour winds hit the city, windows will be boarded, boats moored, and most people will be evacuated.

Since 1966, when the first RCA-built operational weather satellites went into space, no major storm anywhere in the globe has gone untracked. The advance warning, based on information from satellites and other sources, has been credited with saving countless lives and with reducing property damage significantly.

The first weather picture ever returned from space came from the TIROS-1 spacecraft on April 1, 1960. Its resolution was low and detail was lacking, but it marked the beginning of a revolution.

Technology evolved as the 27 TIROS series satellites sent back over 3.5 million views of the world's weather, and the geostationary operational environmental satellites (GOES) returned high resolution visual and infrared imaging from areas over North and

South America every 30 minutes starting in 1974.

The GOES-D satellite, launched September 9, 1980, from the Cape is carrying a new type of instrument known as the VAS, or Visible Infrared Spin Scan Radiometer (VISSR) Atmospheric Sounder.

Scientists at Goddard and the University of Wisconsin at Madison will conduct a long-term experiment to evaluate the usefulness of this instrument for predicting severe local hurricanes, storms, and other short-term weather phenomena.

Previous GOES spacecraft provided day and night, two-dimensional cloud cover photos.

Now the new atmospheric sounder, in addition to the same imaging capability, will be able to measure atmospheric temperatures and moisture at various altitude layers. As with previous GOES satellites, the new instrument will provide both day and night cloud cover photos with a resolution of approximately 0.9 kilometers in daylight and 6.9 km at night.

The additional moisture and temperature data will give forecasters better insight into the energy that precedes a storm or hurricane and what influences storm movement. Temperature readings from within the hurricane eye also will improve the accuracy

of predictions of a storm's strength.

Initially, the new data will be available only to researchers at the University of Wisconsin and NASA's Goddard Space Flight Center. It will probably become routinely available to forecasters in six years.

GOES satellites, which are built by Hughes Aircraft, are geosynchronous, hovering over one spot on the Earth. This experiment will inaugurate a new use for these satellites that will require observation scenarios, data processing systems, and analysis programs differing markedly from those for polar (north-south) orbiting weather satellites such as the

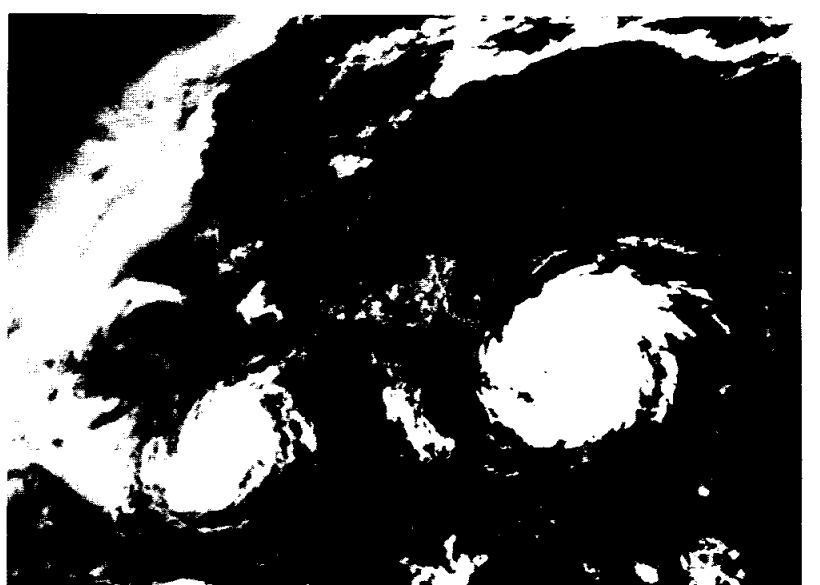
TIROS-N series.

Since GOES is stationary with respect to the Earth, it can observe storms as they develop and hence should be useful in a forecast and warning system.

Over the past few years, scientists from NASA, NOAA, and the University of Wisconsin have been developing ground-based data processing facilities at Goddard and the University. These facilities will be used during the next few years in this experiment to assess the usefulness of VAS data for weathercasting and for increasing understanding of short-lived weather features such as tropical storms, mid-latitude cyclones, and thunderstorms.



First video from space, April 1, 1960



GOES view of Allen and Isis last month