

# ROUNDUP

Lyndon B. Johnson  
Space Center

NASA

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Vol. 17, No. 12

## EXERCISE — who needs it?

The "Physical Fitness Mania" is upon us. The media constantly blasts away about the newest and best exercise programs. Newspapers and magazines are replete with advertisements for the latest equipment and attire.

Joggers greet fellow joggers and discuss the most comfortable shoes and their latest distance attainment. Tennis buffs extol the virtues of the wood versus the metal versus the graphite racket. Exercise is IN!

Exercise—who needs it? How much? Where do you start? Isn't there an alternative to jogging and tennis? What kind of a program is best for the out-of-shape past 40 recent exercise convert?

Dr. Michael Berry, JSC Flight Surgeon, will address these topics and explain the benefits and means for improving your health and attaining a state of good health via exercise and improved nutrition.

He will also explain the "risk factors" physicians so often use in predicting your probability for continued health and well being, plus tell you how these factors can be changed.

Join Dr. Berry on June 28, 1978, in the Building 30 auditorium for this timely topic. The program will be presented at 9:00 a.m. and again at 1:00 p.m.

## Meteorite fragment confirmed rare type

A meteorite found last winter in the frozen reaches of the Antarctic has been confirmed by both the National Aeronautics and Space Administration and the Smithsonian Institution to be one of the rarest types of meteorites ever found.

This rare meteorite, called a carbonaceous chondrite because of its high carbon content, was found with what is believed to be another similar sample and about 300 other specimens.

The carbonaceous chondrite which was examined is a 19.91 gram (nineteen point nine-one gram) sample which has an overall charcoal grey color with a slight olive green cast. The interior consists of a fine-grained grey matrix with about two to three percent light inclusions called chondrules.



**RARE METEORITE**—A meteorite found in Antarctica by Dr. William Cassidy of the University of Pittsburgh, was examined June 8 by scientists, here at JSC to view the find. l. to r. are Betty Gabel, Northrup Services technician; Dr. Christopher C. Kraft, Jr., JSC center director; Grove Murray, vice-chairman National Science Board; and Norman Hackerman, National Science Board chairman.

## Skylab gets 'new lease on life'

### Flight controllers stabilize attitude, maneuver vehicle

America's 85-ton, 118-foot space station, Skylab, has been successfully placed in an orbital position which is expected to give the vehicle a "new lease on life."

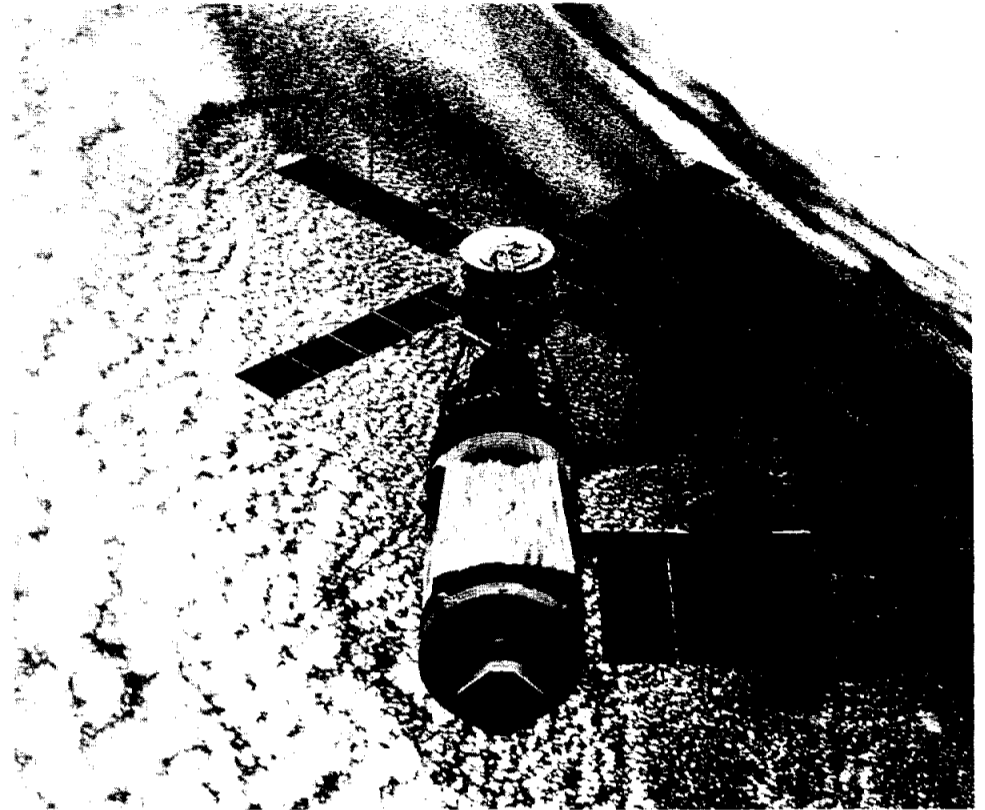
Fighting unknown odds, using procedures developed in real time as the mission progressed, and with a team of people pooled from the Johnson Space Center, Marshall Space Flight Center, Goddard Space Flight Center, IBM, and three tracking stations—Bermuda, Madrid, and Goldstone, California, the Space Agency succeeded in a 4-month-long effort to stabilize and trim the orbital position of the space station.

Attitude maneuvers which began Friday, June 8, and ended on Sunday, June 11, placed the space station in an attitude which reduces the atmospheric drag on the vehicle at its orbital altitude of 242 statute miles. This new attitude is expected to extend by 6 to 12 months the orbital lifetime of the Skylab.

The problem of keeping the space station in orbit was not expected and is due to sunspot activity. Sunspot predictions can be made but are not sufficiently refined at this time to accurately predict over long periods. The science is expanding the understandings of sunspots and other solar phenomenon are progressing, but in 1974 when the last manned crew left Skylab, NASA's predictions estimated an orbital life through 1982—plenty of time to use the Space Shuttle for any Skylab operations.

Late last year tracking of the vehicle by the North American Air Defense Command (NORAD) indicated that Skylab's altitude was descending at a rate much higher than predicted.

NASA's Marshall Space Flight Center, developers and project managers for the Skylab mission, began working full time on the problem of sunspot activity and the Skylab's orbit. A team in Houston began to design an operations center for the proposed Skylab reactivation. Various individuals who had worked closely with the development of the onboard computer and guidance system were rounded up to complement the Marshall-Johnson Space Center teams.



**OVER 30,000 TIMES**—Skylab once again sails serenely in its stabilized attitude as it orbits Earth once every 90 minutes. Since May 14, 1973, Skylab has circled the globe over 30,000 times and still has fuel in its tanks.

In late April the Skylab control room was activated. The flight controllers spent the latter part of April, and May bringing the batteries aboard Skylab up to a fully charged state and checking out the various other pieces of equipment which would be used.

Activity at the Skylab control room

really picked up in June. On Thursday, June 8, flight controllers turned on the dormant control moment gyros. The momentum gyros are one of two attitude torque generating systems which are used to maneuver the space station into a position and hold it. The nitrogen thruster

(Continued on page 4)

## Sunspot activity definite link to Skylab's decreasing lifetime

The idea of sunspots affecting the orbital altitude of a space station situated several hundred miles above the Earth is difficult for non-experts to comprehend. The popular idea is that the atmosphere quits about 100 miles up and beyond that lies the vacuum of space.

Actually the Earth's atmosphere continues well into space with varying densities according to altitude. The troposphere, or weather layer, extends to 13 kilometers and is the atmospheric layer which most affects our daily lives. Beyond the troposphere lie several other tenuous layers. Perhaps the most well known of these is the ionosphere, which begins at about 60 kilometers and doesn't really quit until about 20,000 miles from the Earth's surface. It is in this layer that the two van Allen radiation belts lie. It is also in this layer, over the poles, where the beautiful aurora occur. Beyond 20,000 miles there is still an atmosphere of sorts, though it is created by the Sun's activities.

The Sun spews forth matter and energy referred to as the solar wind. This wind extends out into the further reaches of our solar system and continues beyond, into interstellar space.

As the Sun spews forth greater amounts of matter and energy during high sunspot periods, which occur regularly every 11 years, the energy heats the Earth's ionosphere. The ionosphere is much like a gas and as it is heated it expands, more molecules and ions from lower altitudes fill more space at higher altitudes.

This increasing density cause the velocity of objects in space, such as Skylab, to slow. The physics of placing an

object in Earth orbit are determined by many factors, but orbital speed is related directly to orbital altitude. An object in a particular orbit will decay to a lower orbit if its speed decreases.

This is exactly what the Skylab vehicle has done. The solution to this problem is to place Skylab in an orbital position where it presents the thinnest profile to the atmosphere as it flies through space at about 17,500 mph, minimizing the loss of potential energy.



**COFFEE BREAK** — A friendly local squirrel takes time off from his other duties to have a "coffee break." "It's the bestus kind!"



**WOMEN IN SPACE** — Dr. Carolyn Leach Huntoon, I., was guest speaker at the U.S. Postal Service Career Improvement Convention, May 20, at the Astro Village Hotel. The event was sponsored by the Houston Sectional Center Women's Program Advisory Council. Huntoon's topic "The Role of Women in Space" was the highlight of the program which culminated with the introduction of Dr. Judith A. Resnik, r., mission specialist astronaut candidate. Huntoon is chief of Biomedical Laboratories and deputy for personnel development, Astronaut Office. Ms Welda Sims, center, is postmaster of Old Ocean, Texas.

## NASA JSC-Exchange awards '78 scholarships to Roberts, Underwood

Graduating high school seniors Rita Roberts and Donald Underwood were recently selected as 1978 NASA Exchange-JSC scholarship recipients.

They will join nine other sons and daughters of JSC employees studying under the scholarship program.

Rita is the daughter of Doris J. Roberts, Flight Simulation Division. She attended Booker T. Washington High School, the magnet school for engineering in the Houston Independent School District, and graduated first in her class. She is a member of the National Honor Society, a recipient of the 1977 Certificate of Merit from the Society of Women Engineers, and winner of several other academic awards. Rita participated in the Junior Engineering Technical Society and is involved in a variety of church activities, including Sunday School teaching and serving as a camp counselor. She has not yet decided which school to attend but plans to major in mathematics.

Donald is the son of Leroy Underwood of the Quality Assurance Division. A graduate of J. Frank Dobie High School, Don plans to pursue a degree in mechanical engineering at Texas A&M. He is also a member of the National Honor Society, Mu Alpha Theta, and was recognized for



Roberts

Underwood

academic excellence all four years at Dobie. Other activities that Don has been involved include being on the high school basketball team for three years, being a member of the Junior Engineering Technical Society, and a member of the Mathematics Club, and participating in the Science Fair competition.

Established in 1967, the scholarship program provides up to \$3,000 per student at the rate of \$300 per semester or \$200 per quarter. Students are judged on the basis of scholastic achievement, financial need, and school or community involvement.

## EE major June co-op

Sandra L. Anderson has been selected Cooperative Education Student of the month for June for her outstanding work in the Communications Evaluation Section of the Tracking and Communications Development Division.

Her supervisor A. Don Travis said she had made positive contributions to the development and checkout of the real-time data analysis and predictions system for the Electronic Systems Test Laboratory.

Sandi's work will prove beneficial to the Shuttle program because it is estimated that, with the real-time data analysis and predictions system, the time required to record and plot the results of tests will be reduced by 80 to 90 percent when compared to the manual process used previously, Travis stated.

Her major is electrical engineering at the University of Houston, where she is in her junior year.

## Aide wins \$500 scholarship

Second year summer aide Steve Walton in the Telecommunications Section at JSC has been awarded a \$500 scholarship to attend Texas Lutheran College. The scholarship was awarded Walton by the Lilly Grove Missionary Baptist Church in Houston.

## JSC Golf Association

The big news from the JSCGA is our flurry of hole-in-ones. Playing a JSCGA Four-Ball match on June 8, Tom Chambers hit his ace on Number 12 (163 yards) at Golfcrest. Chambers and Jake Klinar went on to win their match three and two.

Playing in the Group I tournament at Tejas on June 10, C. L. "Andy" Anderson carded his hole-in-one on the 165 yard Number 14. This helped put him in a four-way tie for fourth place.

Our winners at Tejas, who were apparently able to stroke the ball hard enough across the slow and bumpy greens to reach the hole, were Ted Breezy, net 69; George Duncan and Al McIntyre with 75's; and Jim Cioni, 77.

Group II was rained-out at Texas City Bayou, and that tournament is

rescheduled for October 21. They play Tejas tomorrow.



**TEJAS WINNERS**—Standing l to r: George Duncan, second; Jim Cioni, fourth; Ted Breezy, first; Al McIntyre, third. Kneeling: Andy Anderson, hole-in-one.

## JSC Tennis Club

The JSC Tennis Club held a singles tournament June 9-11 at the BARC. Participants were grouped by age.

First match losers competition in men's 19-39 age group (30 entries) was then held with Roberto Moolchan defeating Clebourne Simon and Ken Westerfield for first place. Simon defeated Mark Scates for third place and Bob Myers defeated Tom Rich to win consolation bracket.

In the men's over 40 (24 entries), Ed Mason defeated Floyd Hungerford for first place; Joe Borches won over Gordon Fullerton for third; and consolation was won by Ken Alder over Al Menchaca.

Boy A & B (18 and under), the winners were Boys A: Dave Evans 1st, Doug Voss 2nd, and Kevin Westerfield consolation; Boys B: Jeff White 1st, Pat Murtagh 2nd, and Drew Renick consolation.

Women's A and Girls A (18 and under) classes held a roundrobin with Ruth Damoff and Patty Miller the respective winners.

Women's B class was won by Virginia Riddle over Marie Fullerton and Linda Horwitz won consolation over Judy Meer. This event was highlighted by close matches between Fullerton and Sherry Domigues and novices Susan McCown and Casandra Skabo.

Girls B (18 and under) Kelly Weston won over Leslie Garner and Debbie Demeny won consolation over Lora Schornick.

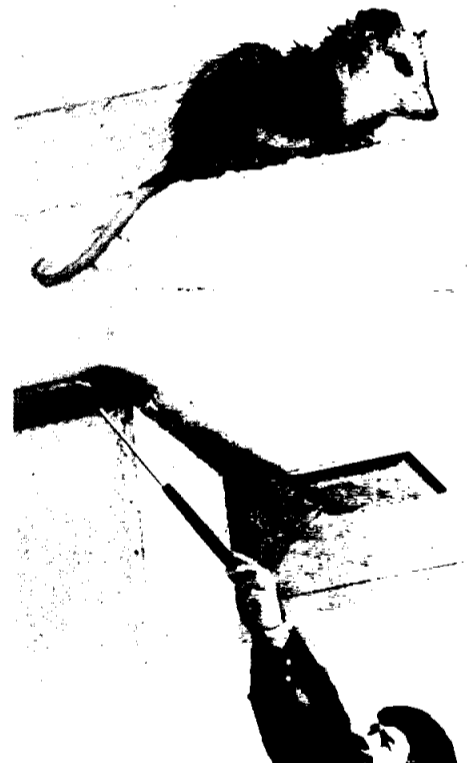
Tournament directors Jim Walker and Gresh Downs as well as club president Frank Newman all finished "out of the money."

The next tournament is planned as a mixed doubles event August 11-13 and will be held at the FRC. For information on the Tennis Club or upcoming events contact Carolyn Thompson X5987, Jim Walker X2611, or Gresh Downs at 333-6431.

## ROUNDUP NASA

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 JSC employees.

Photographer: A. "Pat" Patnesky



**HOW TO CATCH OPOSSUM** — Apparently lost off its mother's back, this opossum looked for higher ground. It found it, atop a support column outside Building 2. A NASA educational type, demonstrates how to get an opossum off a perch. By the way, it didn't work, but he got down anyway and returned to the wild.

## What's cookin' in the JSC cafeteria

### Week of June 26 — 30

**MONDAY** — Cream of Potato Soup: Weiners & Sauerkraut: Stuffed Pork Chops: Baked Chicken: Mean Sauce & Spaghetti (Special): French Beans: Squash: Buttered Beans. Standard Daily Items: Roast Beef: Baked Ham: Fried Chicken: Fried Fish: Chopped Sirloin: Selection of Salads: Sandwiches and Pies.

**TUESDAY** — Navy Bean Soup: Beef Stew: Liver w/Onions: Shrimp Creole: Smothered Steak (Special): Cabbage: Corn: Peas.

**WEDNESDAY** — Seafood Gumbo: Roast Beef: Baked Perch: Chicken Pan Pie: Salmon Croquette (Special); Mustard Greens: Italian Beans: Sliced Beets.

**THURSDAY** — Beef & Barley Soup: Beef Tacos: Diced Ham w/Lima Beans: Stuffed Cabbage (Special); Ranch Beans: Brussels Sprouts: Lima Beans.

**FRIDAY** — Seafood Gumbo: Fried Shrimp: Devilled Crabs: Ham Steak: Salisbury Steak (Special): Carrots: Green Beans: June Peas.

### Week of July 3 — 7

**MONDAY** — Cream of Chicken: Beef Burgundy 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** —

HOLIDAY

**WEDNESDAY** — Seafood Gumbo: Fried Perch: Tamales w/Chili: 8 oz. T-Bone Steak: Spanish Macaroni (Special): Ranch Beans: Spinach: Beets.

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

**FRIDAY** — Seafood Gumbo: Broiled Flounder: Fried Shrimp: Baked Ham: Tuna & Noodles Casserole (Special): Corn: Turnip Greens: Stewed Tomatoes.

## NASA WSTF holds gourmet food contest

In sunny New Mexico, the White Sands Test Facility EAA held their first Gourmet Food Contest. The dishes were varied, delicious, and definitely not for the calorie watchers. The following is a list of the winners of all three classes judged:

### Main Dish Awards:

- 1st - Sue Fries' Vegetable Roll Ups
- 2nd - Geri Tillett's Cauldrio
- 3rd - Catherine Baker's Chicken Tetrazini, New Mexico Style

### Salad Awards:

- 1st - Charlotte Mathis' Strawberry Stuff
- 2nd - Chickie Lerdal's Layered Green Salad
- 3rd - Gertrude Valdivia's Potato Salad

### Dessert Awards:

- 1st - Sylvia Kingsbury's Carrot Cake
- 2nd - Julie Wallin's Sour Cream Pound Cake
- 3rd - Rita Lyons' Pink Lemonade Pie

The event was deemed a fantastic success and the recipes will be placed in the "Land of Enchantment Cookery, NASA WSTF Style," to be published soon.

# EAA Attractions

## BLDG 11 TICKET COUNTER

Astroworld - \$7 (reg. \$8.50) available all season.

Six Flags Over Texas - \$6.75 (reg. \$8.50) available all season.

Disney Magic Kingdom Cards - Free; good for discounts on rides at Disneyland and Disneyworld, and lodging at selected hotels and motels.

Funseekers cards - Free, good for discounts on entrance to Astroworld and all Six Flags and lodging at selected hotels and motels.

Dean Goss Dinner Theatre — \$16 couple, \$8 single, good any night except Saturday.

Fun-Time Card — FREE — good for \$1 discount at Sea-Arama Marineworld.

## DISCOUNT TO HURRICANE GAME

Take the kids out to see pro soccer.

Through our affiliation with the Houston-Galveston area industrial recreation council, HGAIIRC, JSC employees may participate in two discount ticket nights at the Dome. Take your family to one or both of the Hurricane soccer games that are being discounted.

Sunday, July 2, the Seattle Sounders will be in town. The other game is Friday, August 4, against the Tampa Bay Rowdies. Starting times are now set for 8 p.m. However the team may change these to 7:30 p.m.

Tickets for both adults and children cost as follows: Red Section \$4.00, purple section \$3.00 and yellow section \$2.00. Tickets may be purchased at the building 11 exchange store during its normal business hours 8 a.m.-2 p.m.

## CIRCUS TICKETS

The EAA has 300 tickets to the Ringling Brothers Circus in the Summit for the 6 p.m. performance on July 16. The tickets are \$3.50 (regular \$7.00) and will be on sale at the Building 11 exchange store starting June 19.

## LONE STAR DRAMA

NASA nights at the Lone Star Drama in the Galveston Island State Park amphitheater will be July 7,8,9. The drama has been completely revamped this year and is faster moving than last year's edition. Flyers will be distributed to all employees about July 1. Take a copy of the flyer with you to the amphitheater ticket office for a \$1 discount on reserved seats or a 50-cent discount on general admission.



NASA NIGHT JULY 7-9—Sam Houston, angrily defends his retreat strategy despite the qualms and near mutiny of his Texan army in this scene from "The Lone Star," the outdoor drama playing nightly except Monday at 8:30 in the amphitheatre in Galveston Island State Park. NASA discount nights are July 7-9 with flyer to be distributed to all employees on June 30.

## ALLEY THEATER SUBSCRIPTIONS

The Alley Theater Corporate Subscription program is again being offered to NASA and contractor employees. Season tickets are available for next year's five performances at a low price of \$24.50, which may be charged on a variety of credit cards.

See your EAA representative for an Alley Theatre brochure which will explain the program. The brochure contains an order form for subscriptions.

If you are planning to subscribe, fill out the form, enclose a check payable to Alley Theatre or indicate a charge plan on the form and send to Doris Wood, EM (X-2831).

Corporate Subscription coupon books will be home-mailed just prior to the opening of the 78-79 season in October.

## COMING EVENTS

Dean Goss Dinner Theatre — sometime in August

Soul Dance — Sept: 16

Country Western Dance — sometime in October

Defensive Driving — watch for it!

## Dance Club Classes

The JSC Dance Club is sponsoring a "mini session" of ballroom dancing beginning July 12th.

Instructors for the dance session are Bob and Rae Calvert. Classes will meet at the Gilruth Rec Center each Wednesday for six weeks with the Introductory and High Intermediate classes starting at 6:45 p.m. and the Low Intermediate and Advance classes starting at 8:15 p.m.

All classes are approximately 1-1/2 hours each. Cost of the mini session is \$24 per couple, with \$1 per person per year dance club dues.

The Introductory Class will consist of lessons in the Rumba, Waltz, Fox Trot, Swing, Cha-Cha, and Disco. For additional information and partner pairing, contact Lytle Jiongo, extension 3258. The fall session of classes will begin September 13th.

## I.A.M. REVIEW COURSES

Two review courses will be held during the month of August for former students of the Intermediate Automotive Mechanics (I.A.M.) Courses. The first course will cover carburetor overhauls and brakes/shock absorber replacements. It will be followed by a separate course that will cover minor tuneups and ignition system trouble diagnosis. Both courses will consist of one lecture, covering procedures, and one lab. The labs will be four (4) hours (carburetor or brakes/shocks) and two (2) (minor tune up) hours in duration where the students will perform the actual work on their cars. Current plans are to offer these review courses once a year during the fall.

Course	Lecture Date	Lab Date	Enrollment Fee
Carburetor or brakes/shocks	8/9/78	8/12/78	\$19.00
Minor tune up	8/16/78	8/19/78	\$12.00

Auto Mechanics — New sections of both the basic and intermediate Auto Mechanics will be offered also. The basic course will start Wednesday, September 6th. Lectures will be on four consecutive Wednesdays from 7:15-9:15 p.m. in Room 215 of the recreation facility. The lab is set for Saturday, September 23. Cost is \$24.00 per person. The intermediate class will be on four consecutive Wednesdays starting October 11 with labs set for Saturday, October 21 and 28. This class will also meet from 7:15-9:15 p.m. in Room 215. Cost is \$45.00. Sign-up deadline for the classes are August 30 - Basic, and October 4 - Intermediate.

Instructor is R. H. Stanley, X6181 and C. W. Pace, X3278, will assist in the labs. All class sign-up is done at the recreation center. Payment is due upon registration and is non-refundable.

# 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 about 20 words and include home phone number. Typed or printed ad copy must be received by AP3/Roundup by Wednesday of the week prior to publication.

## PROPERTY & RENTALS

Rent: Lake Livingston cottage on water at Nugents Cove. unfurnished \$35 weekend, \$76 week. J. W. Kalk X4207 or 554-6093.

Lease: Middlebrook II, 4-2-2 drapes, landscaped, fireplace, wet bar, patio, available now. \$475/mo., 488-4487.

Rent: Lake Livingston, Cape Royale, compl. furn. home, 3-2-1. Fishing, hunting, tennis, golf etc. Reserve early, Wk/mo/yr. rates 488-4487.

Rent: lakeside vacation retreat at Cape Royale on Lake Livingston. New 3-bdrm. waterfront home compl. fun. Facil inc tennis, pool, golf, boat launch. Rent by wk. or mo., 488-3746.

3.3 acre ranchette in West Magnolia forest, 50 mi. NW Houston, thickly wooded, paved roads, elect., tel., \$8000, 334-3079.

Rent: lovely house in Clear Lake City, 3 bdrm., split floor plan. ready Aug. 1. call Lyn Amann X5376 or 333-2359.

House for lease: Clear Lake Forest, 4 bdrm. Lrm. Drm. Den. 2 1/2 car garage. 11 mo. lease Aug. 1, '78 thru July 31, '79. furnished, consider unfurnished lease. price negotiable, 474-5016.

Rent: Florida, Cocoa Beach, 1 bdrm condo, short drive to Disneyworld & KSC, ocean front, heated pool, sleeps four completely furnished. \$150-175 wk. 486-8220.

Land for Sale: Seven Covers on Lake Conroe, investment buy, Need to Sell, Parker, X4241 or 481-4372 after 5:30.

Cape Conroe—two townhouse lots, sec. 1, blk. 1, priced below market. 488-3319 after 5 p.m.

Sell/lease—Oakbrook 3-2-2, fenced, drapes, close to shopping, park, pool & tennis courts. Avail. Aug. 1 \$400 mo. McCollum 488-4696.

## HOUSEHOLD ARTICLES

Four red velvet dining room chairs, very good condition, \$25 each, 332-6092.

Small washer & dryer in good condition, both for \$125, X2271 or after 6 p.m. 481-4979.

Dinette set, table & 4 or 6 chairs. Pat X5814 or 734-5728 after 5:30.

## CARS & TRUCKS

'77 VW Camper Poptop, a/c, std. shift, 14,700 mi., like new, \$7,795, aft. 5 p.m. 554-6601.

Van seats, 2 low back, tan, new, from '77 Dodge. \$15 each or \$25/both. Bays X5229 or 488-6465.

'76 Pontiac Ventura, air/ps/pb. AM/FM stereo, radial tires, 6 cyl., 482-6542.

'75 Austin Marina 4-dr., excellent cond. 26K miles, 22 mpg on regular. Air, AM/FM stereo. \$2100, Brubaker 554-6034.

'73 Olds Delta 88, 48K miles ps/pb. a/c, one owner, beautiful shape inside and out, no problems, Mike 488-3667 after 5 p.m.

'69 Mustang fastback, 302 V8-2V, beautifully preserved, orig. paint, new externals to engine, new shocks, 2 new tires, runs perfect, 19 mpg hwy., 16 mpg city. Mike X3422 or 488-3667 after 5.

Open Road camper van, has everything including 3KW alternator. Jack Day 664-9472 eve. & wknds.

'74 Blazer, auto, 350 V8, 4-W drive, ps/pb, AM radio, xint. cond., 36K miles, Clubertson X2956 or 664-7540.

'73 Dodge Sportsman, window van, 3/4 ton, 360 V8, air, ps, radial tires, 488-8678.

Wanted '73 or '74 Pickup. 6-cyl., std., box cover, clean, low mileage, Odenwalker X3977 or 534-2702.

'71 Super Beatie, recently rebuilt engine & trans, new paint, S/C, auto stick shift, excellent, Campagna, eve. 729-4357, day 658-1818 or 333-2974 anytime.

'71 Datsun 1200 sedan, red, 4 speed, radio, rustproofed (Ziebart), 35 mpg, good cond., \$750, Mike Williams 471-5781.

'71 Silver T-Bird, loaded, 16K miles, 479-6766 after 6 p.m.

'71 VW 411, auto, new tires/brakes, clean, runs good, has inoperable a/c, \$950, 944-3795.

'69 Ford van, 302 V8, auto, a/c, pop-top. \$1850, 488-2390.

'73 Grand Prix SJ, a/c, ps/pb, p-windows, 6-way p-seat, \$1950 or best offer, 488-0477 or 334-2312.

'67 Chrysler Town & Country wagon, ps/pb, AM/FM radio, dual a/c, runs good, \$400, 473-6516.

## CYCLES

'67 Yamaha YA6, 125 cc street bike, electric start, good cond., \$195 Killingsworth, X5835 or 488-1689.

Honda XL-250, low mileage, never raced, xint. cond., \$600, 488-4696. Bumper carriers for transporting cycles \$20, 488-4696.

'73 Honda CB450, wixom farin, very clean, \$700, 334-2294.

## BOATS & PLANES

Bass boat, '71 Ranger, excint. cond., 60 hp eng with SST prop., Dilly trailer, two depth locators, trol motor, carpet, extras, 333-4732.

18 ft. Sportscraft Tri-Hull, 125 hp Mercury engine, trailer. 2 tanks, 3 props, new tach, sacrifice at \$2200, 944-3640.

## PETS

Labrador pups, AKC, excellent breeding, field champion bloodlines, chocolate sire, yellow dam. Shots, wormed, dew claws removed, 8 wks. black male and yellow female left. 337-5018.

## WANTED

Female roommate to share house in Friendswood with woman and two small children. Private bedroom. \$140 mo. 682-7024.

9-10 hp outboard motor. W. Mallary X4395 or 482-7081.

Exercycle, sturdy design in good cond., Jones X3083 or 488-3976.

Carpool from Montrose/US 59 area. 8 to 4:30, Mathews X5595.

ASEE/NASA summer faculty program participants need to carpool from the Galleria/Woodway area from June 12 to August 18. Will share expenses. M. Cook X4187.

Ride from Main & Hartherbrook, Houston, 7:30 to 4, Sara X4411 or 433-4484.

Need ride from Third Ward/Elgin St. to JSC 7:30-4, until Sept. 1, Gregory Baylor, X5159 or 659-5011.

## CAMERAS/TV/STEREOS

Betamax II video tape recorder, used 2 mos., with clock \$850. 2-hour recording tapes, new \$13.50 ea. New CB antenna \$10. Campagna 333-2974.

## MUSICAL INSTRUMENTS

Ebony Kimbal baby grand piano \$1500, 479-6766 after 6 p.m.

## MISCELLANEOUS

Fresh local honey, just extracted. pints, quarts, gallons. Ward X4976.

4 Wilson X-31 woods—1,3,4,5. completely reconditioned and regripped (Cobra grips) beautiful black cherry finish, D-3 swingweight. \$40 W. J. Kliner X4572 or 331-4643.

Auto tow-bar: universal tow-bar, used once, still in original box \$90. W. L. West X4031 or 474-5052.

Ben Hogan woods—1,3,4,5—Legend shafts (medium) never used, Bob Regelbrugge, X5454 or 944-4982.

Ping pong table, good cond., \$25, 488-4915.

Coleman 100,000 BTU central air heater, attic installation. good cond., works fine, thermostat, return air plenum, evaporator coil, sheet metal transition, all for \$175, McCaulley 471-3298.

7 x 8 feet Don Budge tennis rebound net, good cond. \$15, X5435.

Roofing stapler for rent with or without associated equipment; cheap, Juday 481-3946.

Spinnaker pole, 2" dia. by 10', piston fittings, \$30. Sink s.s. 10' by 14", \$5, 488-3319.

Golf Clubs, golf cart, 2 pr. golf shoes, make offer 488-4696.

Hardwood flooring & wood shingles, make offer 488-4696.

Trailer hitch for Olds, attach to frame or bumper, make offer 488-4696.

# The many moods of Skylab flight control...



Left to right; Ted White, Bill Moon, Jim Saultz, Fred Roberts, Dick Brown, Keith Kundel and Robert Kapustka.

Long hours, persistence, study, figuring, meetings, thousands of commands, computer programs, charging batteries, systems checks, telemetry read-outs, paperwork, etc.....and then a few more commands—the end result, a stabilized, streamlined attitude for Skylab.



Granvil A. Pennington and Keith K. Kundel.



Left to right; Bob Ingenthron, Tom Coon, Herman Thomason, Bob Aller, Bill Chubb and Hans Kennel.

## Skylab

(cont. from page 1)

system is the other. Both systems are controlled by the computer which has various sensors to indicate position.

The momentum gyros worked as expected, although only two of the three aboard the space station are left. The third momentum gyro malfunctioned during the last manned mission in 1974.

On Friday, June 9, flight controllers used the vehicle's Sun sensors as an indicator of the vehicle's position and at the right moment commanded the vehicle to stabilize. On the first possible attempt to stabilize the vehicle, controllers got their cue and commanded the space station to hold its position. This caused the onboard computer to fire nitrogen thrusters, arresting Skylab's rotation. Although the attitude control system hadn't been used in over four years, the system performed perfectly and within several minutes the space station had settled down and had gone into a stable position pointed within 20° of the Sun.

Flight controllers manually maneuvered the Skylab in roll and pitch to center the vehicle on the Sun. The gravity gradient forces then settled the Skylab into the orbital plane flying rear end first and flight controllers had to yaw the vehicle 180° to turn it around so it was flying in the proper direction.

Before the time Skylab was captured out of its wobbling and spinning position and stabilized, electric power from the solar panels was available only when illuminated by the Sun. The ground team had to get the space station into a position with the solar panels exposed continuously to the Sun so Skylab's batteries could be continuously charged and the rest of the planned activities could be performed with sufficient electrical energy. The vehicle solar inertial position is the best attitude for this since the vehicle tracks the Sun with the solar panels always into the Sun.

A maneuver planned for Saturday, June 10, was postponed a day so the Marshall engineering team could verify by ground computer simulation that a problem which occurred about noon on Friday wouldn't repeat. On Friday morning the vehicle had been commanded into the solar inertial position. The maneuvers to achieve a stable space station had consumed a considerable amount of the nitrogen stored aboard. Flight controllers wanted to enable the redundant computer onboard which could take over control if the prime computer should fail. In the process of commanding the vehicle to turn on the redundant computer a

decoder onboard the space station issued an extraneous command which shut off the control servo unit on one of the momentum gyros, making it to be non-responsive to computer commands. This occurred as the space station was passing away from the ground tracking station. The problem was corrected during the next station pass but resulted in using about one fifth of the nitrogen gas remaining.

The computer aboard Skylab continued to compute attitude control based on its programmed knowledge of two working momentum gyros. With only one momentum gyro the computer was getting into a situation where it sensed the vehicle wasn't maintaining its position. When the computer sensed the vehicle had failed to hold its position, it automatically fired the nitrogen system to regain attitude control. This happened three times before the space station was again in tracking station coverage and controllers could activate the inadvertently disabled momentum gyro. Press accounts at the time said the vehicle had gone out of control. It had gone out of the planned mode of control, but within the program the computer was working from, the vehicle remained within control with the nitrogen system and when it came back into tracking station coverage had maintained its position.

At 1:50 a.m. CDT, Sunday, June 11, Skylab was commanded to go from solar inertial position to "Z-local vertical." The ZLV position keeps the space station's long axis parallel to the surface of the Earth that its over at any given moment. The space station executed the command flawlessly and the stage for the final, minimum drag, position was set. During the next station pass at 3:28 a.m. CDT the vehicle's computer was commanded to modify the ZLV position by allowing the Skylab to roll so the solar panels match the Sun's changing position in the sky. The Sun changes with respect to the Skylab orbit about three degrees per day. This placed the vehicle in what is the thinnest profile in its orbit.

The next step is to maintain the Skylab in good health until early 1980 so the development and testing of the Space Shuttle can be completed and work on the teleoperator retrieval system can be completed. Present options include either a reboost to a higher altitude or a deliberate deboost over an unoccupied portion of the Earth's oceans. Both options would use the teleoperator system which would be carried up and recovered by Shuttle. A Space Shuttle crew would fly up to the Skylab and the teleoperator would then be remotely flown and docked with Skylab to perform this reboost/deboost mission.



Left to right; Bob Aller, Gene Kranz, Pete Frank and Bill Peters.



Left to right; Fred Roberts, Bill Peters, George Guthrie, Jim Webb, Will Fenner, and Harry Clancy; standing l. to r. George Abbey, Steve Bales, Pete Frank and Gene Kranz.