

## Engineers Choose Fix to Remedy Saturn V 'Pogo' During Launch

NASA has completed tests to isolate the longitudinal oscillations or "pogo" problem of the Saturn V launch vehicle and has mapped out a means of preventing excessive oscillations. The solution will be verified in a test firing of a flight stage early this month.

The solution will be the use of accumulators or small gas reservoirs in the liquid oxygen prevalves of the first stage to change the frequency of oscillation in the propulsion system.

The oscillations resonating with the vehicle structure natural frequency caused considerable concern among rocket engineers during a portion of the flight of the second Saturn V. It was launched from the NASA-Kennedy Space Center last April 4.

The Saturn V—a three-stage rocket 363 feet tall with the Apollo spacecraft in place—was developed by the NASA-Marshall Space Flight Center as the launch vehicle for the manned lunar landing mission.

Engineers working on the problem encountered during the flight of the second Saturn V have completed analyses, studied flight data and conducted hundreds of tests in identifying the cause of the up-down motion of the vehicle.

The natural frequency of the vehicle structure is about four cycles per second. The frequency of the propulsion system was between four and five cycles per second.

Changes in mass, such as when propellants are being drained from the tanks, increase the frequency level of the structure. The frequency level of the propulsion system also increases as the flight progresses but at a slower rate.

Since the propulsion system frequency was only slightly above that of the structure, and since the structure frequency increased faster, the frequencies grew closer together and finally coincided.

When two frequencies are the same or very near, the amplitude, or severity, of the oscillations are multiplied. This is what happened during the flight of the second Saturn V.

The task facing the engineers was finding the best method of keeping the frequencies apart. Several possible methods were considered but these were nar-

rowed to two candidate fixes which received maximum attention.

One possible solution was to inject helium into the liquid oxygen feed lines to change the frequency of the propulsion system.

The decision was made, however, to use shock absorbers in the LOX prevalves to dampen out any oscillations that might occur in the feed ducts. This would reduce the natural frequency of the propulsion system to about two cycles per second, lower than that of the structure.

Prevalves are located in the five LOX ducts just above the engines. They serve to detain the LOX in the feed ducts until late in the countdown, when the fluid is admitted to the main LOX valves on the engines in preparation for ignition.

Each prevalve has a cavity in which a gas pocket will be main-

*(Continued on page 2)*

## Modisette Named Senior Scientist On Hess' Staff

Dr. Jerry Modisette, chief of the Space Physics Division, has been appointed Senior Staff Scientist on the staff of the MSC Director of Science and Applications.

Dr. Stanley C. Freden, former scientist with the Aerospace Corporation, El Segundo, California, has been named Modisette's successor.

The two appointments were announced last week by Director of Science and Applications Dr. Wilmot N. Hess.

In his new post, Modisette, 34, will serve as a senior advisor and consultant to the Director of Science and Applications for all directorate programs in space physics. Shreveport native Modisette is a 1956 graduate of Louisiana Polytechnic Institute and received an MS in physics from Virginia



Polytechnic Institute in 1960 and a PhD in Space Science from Rice University in 1967. He joined the NACA Langley Research Center in 1956 and later transferred to MSC.

Before his appointment as chief of Space Physics Division in November 1966, Modisette served as chief of the Radiation and Fields Branch at MSC.

Freden, 40, who will assume his new duties this week as chief of the Space Physics Division, has been senior staff scientist at Aerospace since May 1961. From July 1957 to May 1961, he was senior physicist at the University of California's Lawrence Radiation Laboratory at Livermore, California. Freden is a native of New York and a graduate of UCLA where he received a BA in math and his masters and PhD degrees in physics.

As chief of the Space Physics Division, Freden will be responsible for developing space science programs in the area of space radiation, meteoroids, atmosphere, solar and interplanetary medium physics, and astronomy.

## Spinal Growth Forces Collins To Leave Third Apollo Crew

Michael Collins, prime command module pilot for the third manned Apollo mission, July 23 successfully underwent surgery for removal of a bone spur growth from his spine. Collins checked into the USAF Wilford Hall Hospital, San Antonio, Texas after X-rays and other tests had confirmed the growth's presence.

He had earlier noticed abnormal physical sensations. The cause of the bony growth in the neck area is unknown.

Collins' recuperation likely will be from three to six months, medical authorities estimated following the no-complications surgery. The recuperative period eliminates Collins from the crew of the third manned Apollo mission, scheduled early next year.



Collins' replacement on the prime crew will be named shortly. Others in the crew are Frank Borman, commander, and William A. Anders, lunar module pilot. Collins was pilot on the Gemini X mission, with John Young as command pilot.

## Meteorite Quest



THE HUNTER—MSC Lunar and Earth Sciences Division chief Dr. P. R. Bell hunts meteorites with the aid of a metal detector near Del Rio, Texas. Bell and Lunar Receiving Laboratory curator Dr. Elbert King located five fragments of a large meteorite recently discovered in the Del Rio area. The fragments will undergo detailed analysis in the LRL.

## Apollo VII Spacecraft Passes Manned Altitude Test Series

The Apollo VII spacecraft Monday successfully underwent the second of two manned altitude chamber runs at the Kennedy Space Center with backup crewmen Thomas Stafford, John Young and Eugene Cernan aboard.

After the crew entered the spacecraft at 5:55 am CDT, the chamber was pumped down to an equivalent altitude of 200,000 feet for the duration of the test. The crew left the spacecraft at 2:50 pm CDT.

The decision to proceed with the second test was made following the assessment of the July 26 highly successful first run by prime Apollo VII crewmen Wal-

ter M. Schirra, Jr., Donn F. Eisele and Walter Cunningham. The prime crew spent nine hours in the spacecraft, most of the time at an altitude of 226,000 feet.

"The major purpose of the tests is to prove out all the spacecraft systems under altitude conditions," said Apollo VII commander Schirra. "The spacecraft, the test team, and we the crew, had a good run, but it's like the first game of a double-header."

"We need to complete both manned altitude runs successfully before Apollo VII can be considered ready for flight," he said. "The two manned runs supplement each other as far as systems verification is concerned."

"Then, we still have some major milestones to pass at the launch pad with the spacecraft and Saturn IB mated before we'll be ready to go."

Schirra added: "Our confidence in the spacecraft was so high that we were able to vent the cabin and remain for several hours at a high altitude in our pressurized suits, relying solely on the spacecraft systems for support."

This phase of the test simulated a possible emergency where the spacecraft cabin suddenly lost pressure in orbit. Similar conditions—referred to as "hard suit"—occur when a crewman performs extravehicular activity outside the spacecraft.

During the test with the prime crew the cabin atmosphere was first pressurized with a 60 per-

cent oxygen 40 percent nitrogen mix. Later the cabin was purged at altitude and repressurized with 100 percent oxygen at 5 psi—the normal orbital atmosphere.

The backup crew test cabin atmosphere maintained the 60/40 ground test atmosphere throughout the run.

The Apollo VII Saturn IB launch vehicle is mated at Launch Complex 34 and has completed combined systems testing. Tests were run last week of the ground support liquid hydrogen lines and of service tower swing arms.

Apollo VII is scheduled for launch later this year and will be the first manned Apollo mission.

## Fire Prevention Meet Held Here

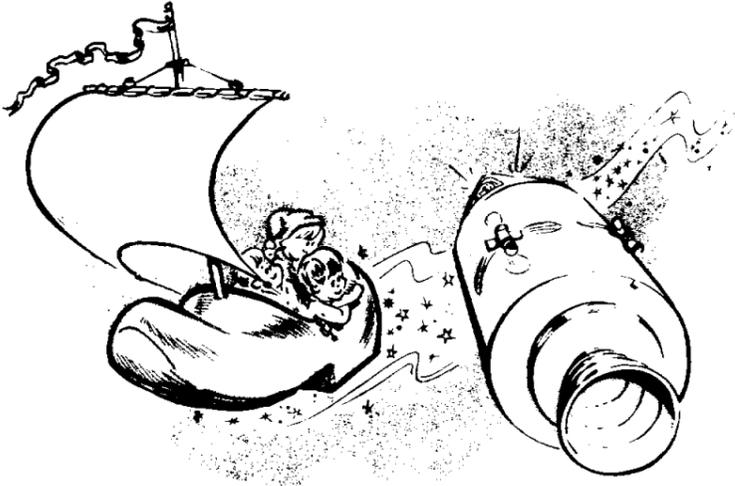
MSC this week hosted a NASA-wide fire prevention meeting to examine fire loss management and to discuss means for fire prevention and control at agency facilities.

More than 60 fire prevention experts from NASA field centers, military commands and aerospace industrial firms attended the meeting.

Speakers included NASA Director of Safety B. P. Hegelson, chief engineer Horatio Bond of the National Fire Protection Association, Louis Almgren of Gage & Babcock and Lester Eggleston of Southwest Research Institute. Topics covered in the meeting included evaluation of fire hazards and risks, codes and standards, and special aerospace fire problems such as space simulators.

**THE ASTRONUTS**

(filched from TRW Systems Group)



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**Your Job in Focus**

**Designation of Beneficiaries**

Employees should review periodically their position regarding Federal Employees Group Life Insurance, Retirement benefits, and Unpaid Compensation to assure that all designations of beneficiaries are satisfactory. There have been occasions when employees failed to change beneficiaries to suit altered circumstances. Also, designations of beneficiary for Federal Employees Group Life Insurance and Unpaid Compensation are automatically canceled when you change Agencies.

You do not have to name a beneficiary if you are satisfied to have these benefits paid in the order of precedence provided by law; that is: (1) widow or widower; (2) child or children in equal shares; (3) parents in equal shares or the entire amount to the surviving parent; (4) duly appointed executor or adminis-

trator of your estate; (5) next of kin under the laws of your domicile at the time of your death.

If you want to name a beneficiary or change the designation, you may obtain the necessary forms from the Personnel Division, Administrative Section, extension 7381.

**NASA Trial Retirement System**

NASA Headquarters has drafted a policy directive to establish a NASA Trial Retirement Program. The plan provides for the retirement of an employee, on a trial basis, for a period of one year, with the right to be employed at the end of the trial period at the same grade and salary subject to certain conditions.

To be eligible for the program, an employee must first be eligible for optional retirement; that is, age 55 with 30 years service; age 60 with 20 years, or age 62 with 5 years.

**Outside Activities**

It has been the policy of NASA to encourage employees to participate freely in all types of outside activities which are compatible with the duties and responsibilities of their Government employment. There are, however, certain guidelines and limitations when participating in activities as a private citizen. These are outlined in detail in NASA Handbook 1900.1A, "Standards of Conduct for NASA Employees", which has been furnished to all employees.

Employees are responsible for familiarizing themselves with the contents of this handbook. Included in the limitations set forth in the handbook is a requirement for obtaining administrative approval before engaging in certain types of outside activity. Procedures for obtaining this approval are also included in the handbook.

Questions regarding either the contents of the handbook or the procedures for obtaining approval to participate in outside activities should be directed to Glen Brace, Personnel Division, extension 2358.

**HAPPE Chutes Pass Test Drop**

Phase I of the test program to evaluate the descent system for the High Altitude Particle Physics Experiment (HAPPE) July 26 was successfully completed at White Sands Missile Range, N.M. The test verified the rigging and deployment characteristics of the 100-foot tri-conical parachute planned for use in the HAPPE balloon flight program.

A 4500-pound test article was dropped by a helicopter from 10,000 feet, the second of two air drops in the Phase I operation. Phase I-A of the descent system test utilizing a cluster of three 100-foot chutes and a 9500-pound test weight will be conducted in September.

HAPPE is a NASA-University of California joint project for using naturally-occurring radiation to investigate elementary particle interaction in the high-energy domain. The prime HAPPE payload element is a cryogenic superconducting magnet with an effective field region of one meter in diameter, one and a half meters in length, and a maximum magnetic field value of about 10 kilogauss.

The HAPPE payload is a gondola standing 50 feet tall, eight feet in diameter and weighing 10,000 pounds. The payload will be launched from California in 1969 to an altitude of about 90,000 feet and recovered in the Pacific Ocean.

**Mimosa Bowlers Meet**

The Mimosa Men's Bowling League August 8 will hold an organization meeting at 5 pm in the MSC Auditorium. The league will bowl Thursday nights at 6:30 pm at Mimosa Lanes starting September 5.

Bowlers interested in joining the league should call Dan Kennedy at 3296 for details.

**SAAP Payload Called Success**

Data analysis of the June 12 South Atlantic inner radiation belt probe has confirmed that all systems performed satisfactorily and that radiation levels represent no hazard to low-altitude manned orbital Apollo flights.

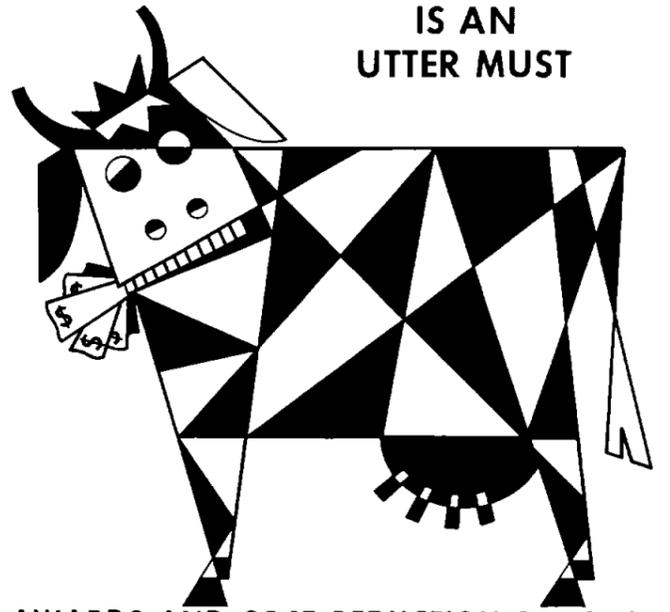
The South Atlantic Anomaly Probe (SAAP) was launched from the Barreira do Inferno range near Natal, Brazil on a 15-minute 502-mile flight to verify accuracy of radiation dosimeters and other instruments carried in the 80-pound MSC-built experiment payload. Launch vehicle was a two-stage solid-propellant Canadian-built Black Brant IV.

MSC Science and Applications Directorate senior staff scientist Dr. Jerry Modisette said the radiation levels recorded by SAAP are comparable to data gathered during manned Gemini missions and unmanned satellite probes. He said final analysis verifies that the SAAP system meets design requirements.

The next SAAP flight is tentatively scheduled for early 1969.

*it's no BULL!*

**COST REDUCTION IS AN UTTER MUST**



**AWARDS AND COST REDUCTION PROGRAM**

**Saturn V 'Pogo' Remedy**

(Continued from page 1)

tained. Filling the cavities with helium will begin ten minutes before liftoff and will continue after start-up of the first stage engines.

A relatively small amount of gas is required—about 2.1 cubic feet in all five of the first stage engine feed systems. The only modification required to the stage is provision of a means of injecting helium into the pre-valve.

The helium is fed into the accumulator initially from a ground source; after launch the small amount needed for replenishing comes from the onboard helium vessels which are used to supply gas for the operation of certain valves, for pressurizing the fuel tank and other purposes.

Kits for modifying the vehicle to accept either of the two candidate fixes were prepared and

tested early in the study to save time.

Modifications are being made now in the first stage of the third Saturn V launch vehicle, now at Kennedy Space Center, and to the first stage of the sixth Saturn V. The latter stage is in a test stand at the Mississippi Test Facility being prepared for test firing early in August.

Lee B. James, Saturn V Program Manager at the Marshall Center, said about 1000 engineers working on the problem included those from MSFC, the Boeing Company, the Martin Company, TRW, Inc., Aerospace Corp. and Rocketdyne Div. of North American Rockwell. Martin and TRW personnel worked on the problem from independent positions, and Aerospace Corp. engineers served as consultants.

**Co-op of Month**



**HIGH STANDARDS** — Hugh W. Coleman, mechanical engineering junior at Mississippi State University, is assigned during work periods to the Propulsion and Power Division Power Generation Branch where he has been involved in fuel cell and vapor-cooled dewar test and analysis normally assigned to more experienced engineers. Technical ability, the ability to work well with others and high standards of performance are attributes listed by his supervisors.

**Almost Journeyman**



**EXPERIMENT CIRCUIT**—Fourth-year apprentice Marvin F. Williams scales printed-circuit board artwork for an Aurora Borealis experiment prior to its photographic reduction to final size. Williams is in the Technical Services Division Electronics Branch and will graduate from the MSC apprentice program in the fall.

# Roundup Swap-Shop

(Deadline for classified ads is the Friday preceding Roundup publication date. Ads received after the deadline will be run in the next following issue. Send ads in writing to Roundup Editor, AP3. Ads will not be repeated unless requested. Use name and home telephone number.)

### FOR SALE/RENT—REAL ESTATE

8-month old French Provincial in Baybrook: 4 bedrooms, separate dining room and living room, large family room w/fireplace, kitchen and dinette, utility room and separate two-car garage with fenced backyard, refrigerator, washer, dryer, and miscellaneous furniture included, central air/heat, located on court, away from main traffic and apartments. Cost \$25,000 equity and assumption. Dave Peterson, GR 4-3681 after 5.

Rent by day or week, 1 bedroom furnished beach house, all electric kitchen, at Bolivar. Has boat dock in front. Evelyn Huvar, HU 3-7626 (no home phone).

For rent—2 rooms with house privileges in quiet residential section. Male or couple with teenagers. L. Palmer, 877-1269 after 6. Lake Livingston Acres—Lot 250' x 600' (3.44 acres), \$2975. John D. Richardson, 946-7587.

El Lago—407 Pebblebrook Dr., wooded lot, 3-2 1/2-2, functional storage, screened porch, Howard swimming pool, beamed-ceiling family room, fireplace, beautifully draped, brick and white aluminum siding, many other extras. Owner day or night GR 4-2741 or 877-1051. Immediate occupancy.

Loan assumption—total price \$18,400, equity \$4,400. California modern 3-2-2 brick, close to everything. Desirable, features include: central air, fully automatic kitchen with dishwasher, fenced back yard, and walk-in closets. The low 5 3/4 percent presently established loan makes the total payments only \$130 per month. Will consider second lien for responsible party. Very anxious to sell since construction on my new house is almost completed. 11227 Sage-way Drive Jim Stephens, HU 7-0095.

Assume loan—3-1 1/2-2, payments \$115 mo. at 5 3/4 percent. Central air/heat, fenced, new carpets, parquet floors, walking distance to junior high and elementary schools, Seabrook. H. R. Banziger, 474-3571.

3 bedroom, brick with fenced pool. Gulfway Terrace, Exit 15 Gulf Freeway between new Foley's shopping center and Pasadena Plaza. Central heat and air conditioning, two baths, two-car garage and utility room. Equity and assumption of 5 1/4 per cent FHA loan. Stewart, 946-1004.

Sale or rent, lakeside 2-bdrm cottage block from South shore of Clear Lake, rent \$120, price \$8900. C. R. Perrine, 877-2165.

4-bdr, 1 1/2-bath, 2-car garage, family room, electric kitchen, central heat/air, carpets, \$21,000—2000 down, 6 per cent interest, take over payments. 1902 Sunset Court North, League City. R. Longnau, 932-3187.

1 1/2-acre residential lot. Established community. FM 1764 near County Memorial Hospital. 350' frontage on county maintained road. 15 minutes to NASA, \$2500 total price. H. L. Day, 877-1152.

For rent, efficiency new Clear Lake, 2326 Lidstone, Seabrook. \$100 month, unfurnished. J. Gregan, 474-3117.

Fairmont Park 3-2-2, full brick, air/heat, roomy eat-in kitchen with much wood cabinetry and all built-ins, paneled den, living room, ceramic tile baths and kitchen clay tile foyer, hardwood floors, all venetian blinds. Mature trees and shrubs, fenced backyard, high ground. 20 min. to MSC, 10 to shopping, walking distance to school, free pool and corner store. Community services include backyard garbage, police patrol, etc. Price—\$16,000. \$3000 for equity and assume 5 1/4 percent FHA loan. Payments of \$131 a month. Miceli, GR 1-0723.

1/2-acre lot in Friendswood, Imperial Gardens. Sacrificing for \$4250. Harold Dairon, 944-6993.

Approximately 1/2 acre off Red Bluff Road (near Hwy 146) residential area. High ground, within 1 mile of water. Sandy Burd-sal, 733-8384 after 5.

3-bedroom colonial one mile from MSC gate. Large family room w/fireplace, dining, utility room, all built-in kitchen, 38-foot screened-in lanai, two car garage, large swimming pool, fenced, well developed landscaping, two full baths. Large floored attic storage area. Central air. \$30,000. C. Wasson, 877-3003.

Friendswood area, contemporary home (A-frame design), country setting, 1 acre lot, architect designed, 3 years old, 6 1/2 percent mortgage, 2 bedroom, 1 bath, studio, WBF. Charles F. Allyn, HU 2-7574.

### FOR SALE—AUTOS

'54 Pontiac Tempest Custom 4-door sedan, 326 V-8, automatic, air-conditioning, new brakes, new shocks, 2 new tires, original

owner, \$1,250. J. O. Covington, 487-3066.

'62 Starfire Olds, good condition, good tires, full power and air. Dick Mains, HU 8-0024 or (evenings and weekends) 932-4692.

Careful lady driver, one owner, 4-door '63 Plymouth, factory air, radio, heater, Torqueflight, 4 new tires. Tilton, 946-0656.

'63 Rambler Classic 770, V-8 stick, air, new tires and battery, extra clean, low mileage, original owner, \$750. John Lang, 932-2294.

1929 Model "A" Ford—2-door sedan. Has rebuilt front end, new brakes and drums and excellent body. \$700, Larry Arnim, 591-4629.

Station wagon—1964 Chevelle with V-8, automatic transmission, radio, and heater, very clean. A-1 transportation. \$1095. Shu-bert, HU 7-1683.

'66 Dodge pickup, 1/2 ton. Short wheel base, wide body Excellent condition, six-cyl., standard, 5 new tires. Shirley Horn, 487-0371 after 3 p.m.

1961 VW sedan, red, radio, sunroof, new SWS tires. 15000 miles since major engine overhaul. Some body damage. Best offer over \$300. L. V. Lindley, 877-3046.

Plymouth Fury III 1966. V-8, loaded, 4-door, aqua-color excellent condition, \$1850. David Howe, 591-3282, ext. 190.

'67 Falcon—Futura, air 3-speed, mint green, top condition, 13,310 miles. Must have top retail price. Herb Tash, 534-3414.

'66 VW sedan 1300 model, leatherette upholstery, 25,000 miles, excellent condition, \$1100. Woody Rasco, GR 3-0769.

'59 Chevrolet Brookwood 2-door wagon, 6 cyl. stick shift, air conditioned. \$150. Ben Locher, GR 1-4387.

'61 VW, fair condition, no reasonable offer refused. John McNulty, Dickinson, 534-3792.

1955 Ford Fairlane, 4-dr., clean, no rust, excellent mechanical condition. V-8, over-drive, power steering, radio, \$225. K. Zeiler, 944-6465, ext. 4146.

1967 Sunbeam Alpine, AM-FM radio, wire wheels, whitewall radial-ply tires, \$150 equity and take up payments. Total price below NADA average retail. Bob Schmitz, 946-4856 after 5:30.

1964 Pontiac Bonneville, 4 door, power, air, \$995. A. E. Harrison, GR 4-3441.

### FOR SALE—MISCELLANEOUS

Mobile home for lease, furnished, air. Will relocate to your choice area, if on a long-term lease. Reasonable rent. Floyd A. Turner, RE 3-7667.

1964 Corvette Positraction rear axle assembly, complete w/traction bars, suspension assy, wheel hubs, brakes, etc. \$115. Also Corvette dashboard (all instruments except radio) \$45. Ron Hagood, WI 8-2870, Texas City.

Antique gold wrought-iron table with Champagne glass top and four matching chairs with apple green leather cushions. Original price \$200. Used 2 mo. Sell \$150. Evelyn Huvar, HU 3-7626 (no home phone).

Fireplace screen with draw drapes, log holder, tools with one extra large log prong holder, all match, and grate. \$50. Evelyn Huvar, HU 3-7626 (no home phone).

Stud service—Champion English stock, male silver blue AKC registered miniature poodle. Evelyn Huvar, HU 3-7626 (no home phone).

1 pair \$18 dark men's dress slacks, waist size 44, length to fit 6' man. Cleaned once. Sell \$10. Evelyn Huvar, HU 3-7626 (no home phone).

Black female—miniature toy poodle—AKC, 30 champions, 5 generations, \$75. HU 2-7012 after 5.

Martin Busine Bb clarinet. Needs some work. \$40. Also, Getzen Bb bass clarinet, excellent condition. \$150. Both for \$175. One music stand throw in free. Linda Gennett, MI 9-3576 after 8 pm. Anytime Saturday and Sunday.

Rent my 1966 Cessna 150 or 1967 Skyhawk. Attractive rates! Instruction also available. Earn your private Pilot Certificate for as little as \$450. N. Tilton, GR 9-1176.

Lone Star 16 sailboat with galvanized tilt trailer, 4 life jackets, masthead fly, bottom paint, tarpaulin, 3 1/2 hp outboard, all in excellent condition. Ed Simon, 488-4043.

16' fiber glass Aristocraft boat with canopy, 40 hp Johnson electromotor, tilt trailer, set of skis, slalom sk, all 3 years old and hardly used, excellent condition, cost new \$2800, will sell for \$1400, call 488-3641 after 5, Frank Van Reusselaer.

Yamaha 12-string electric, brand new, show room condition, \$200. R. B. White, 877-4011.

1966 18-foot Thunderbird Cheyenne Boat, fully equipped with head and sonar, large wheel trailer w/tilt and lift rollers, 100 hp Evinrude with 75 hrs., must sell. Dick Mains, days—HU 8-0024, nites—932-4692.

Lawn mower, rotary, 24-inch, 3 1/2 horsepower, Briggs and Stratton engine, \$20. Uel S. Clanton, 482-7187, Friendswood.

Half interest in 20-foot O'Day Mariner sailboat (keel). Fully equipped with sails, head, sink, motor, and cushions. Bottom freshly painted. Presently at Watergate Yacht Club. Bob Kempt, 644-7296.

Commanche 250 1/2 share. Mark 12/360, Mark 5, dual omni, ADF, autopilot, tip tanks, IFR panel. Range more than 1,000 nm @ 155 knots. (Easy non-stop to Cape, one stop to most distant U.S. points.) Sacrifice, must sell. Sal Tripoli, 591-3300 (office) or 877-2673 (home).

TV, black and white, Sears, 25", excellent condition, 18 months old, very nice modern walnut cabinet, \$120. A. F. Smith, HU 8-3238.

17' c.b. sailboat, all fiberglass with dacron sails, covered foredeck, cuddy, and galvanized tilt-trailer. Roominess, stability, and storage space make it a perfect family boat. All in excellent condition. \$1650. Ted Sampsel, GR 1-0172.

Chrome dinette set, table and four chairs, good condition, \$17.50. John D. Richardson, 946-7587.

Sealy Comfort King premier twin-size mattresses and box springs with headboard. Excellent condition. \$40.00. H. Kaupp, MI 9-4357.

Paul McCob, walnut wood, sofa, chair, end tables, and lamps. Good condition. Mary Duckett, HU 8-1496.

Sixteen feet of boating pleasure. Glass covered ply with hardwood ribs powered by Evinrude four-fifty. Interior stripped for fishing and sport. Complete set ski equipment and preservers. Extra heavy duty trailer w/large wheels. Excellent family first boat. First \$750, cash offer. Bill LeCroix, 877-2479.

Danish modern living room suite: couch, 1 chair, 2 table lamps, 1 step table, coffee table, 1 floor lamp, 24" oct. mirror, and 24" barbeque, warming oven w/temp. gauge, spit and motor. Used once, cost \$25, will sell for \$15. W. Cook, 932-2895.

Hemistair family lodging, 4 miles from Fair, 1/2 block from bus stop, large, fully furnished, 2-BR apt. \$15/day. Louis Ponce, 534-4618, Dickinson, after 6.

Ping-pong table; fold-away type with casters. \$12.00. Hammack, 877-1657.

Dyna stereo FM tuner, Dyna stereo pre-amp., Dyna 70 watt stereo power amp. Replacement cost over \$400. My price, best offer over \$200. Mint condition. Robert Hymer, MI 9-0416.

Grey French provincial double bed, mattress, box springs, and desk. All hardwood furniture. \$100. Larry Arnim, 591-4629.

\$300-Tappan gas range for \$80. Used 18 months. Perfect condition. HU 3-2091. Dorothy Phelan.

Sewing machine: Singer Model 99, straight-stitch portable with attachments. Recently cleaned and adjusted. \$30. R. Mennella, HU 8-0398.

Radio control model airplane outfit complete. 10 channel O.S. minitron transmitter and receiver, airplane (5 1/2 foot high wing with 0.35 engine) and 4 spare servos. 6 of the 10 channels are presently in use. (Elevator, rudder, throttle). Any reasonable offer. F. C. Jensen, 477-2659 after 6.

Double bed, xlnt condition, \$30; extra strong baby bed, \$35; baby dresser, \$5; baby-butler chair, \$5; baby carriage deluxe model, \$10; stroller—Welsh, \$5; baby bed bumper, \$1.50. E. Kranz, Dickinson, 534-4125.

Pickup camper, cabover type, built for short wheelbase, 1/2 ton (Ford or Chevy); \$150; Bill Gatlin, League City, 932-3969.

Fury motorcycle helmet, same as new, cost \$38.50, sell for \$25. Floyd Eaton, HU 2-7047. DuPont nylon carpet, oyster color (dark ivory). 22' x 12', used 1 1/2 yr. \$85. includes pads. David Grissom, 932-4206.

4 used tires 65.14, in fair condition. J. Templeton, OX 4-9013, between 2 and 7 p.m.

5 kittens seeking good home. 6 weeks, house broken, free. Tom Linbeck, 482-1558. Royal portable typewriter, good condition, \$39. Minna Squires, 534-3137.

1964 Sears tent trailer. Opens to 7' x 15'; 7' x 11' nylon floor on ground plus enclosed 4' x 7' area over trailer. 3" foam mattress sleeps two. Plenty of storage space inside trailer. Three large windows for maximum

ventilation. Spare tire included. \$300. Ed Lattier, Dickinson, 534-2756.

Double innerspring bed, with roller frame, \$40. Speaker, 12" woofer, horn tweeter and crossover network in home-built box, \$15. 18-watt Knight kit amplifier, non-working, \$10. Small straight chair, \$5. Wicker basket chair with green corduroy, \$10. J. W. Moore, 528-2101.

Collie Pups: 2 AKC registered females, champion line at a sacrifice price. All you pay is vaccination and deworming costs, (\$20). Hooper, 488-4120.

Boxer puppies, only five more to pick from. Mama is a registered Boxer—Pa was a black and tan. Pups are beautiful and look like Boxers. Puppies must be placed prior to family vacation time. Smith, 471-2419.

Antique clock, \$50. Tapestry covered easy chair, \$30. Binoculars, 8 x 35, new \$20. Nesco electric roaster oven on stand, \$30. J. H. Levine, MI 9-2569.

Beautiful antique French sofa and chair, beige, \$400, perfect. J. H. Levine, MI 9-2569. Bay fishing rig, 14 1/2 Helton boat with 35 hp electric Evinrude, small wheel tilt trailer. Ready to go, \$335. G. E. Hoff, 474-3825 after 5:30.

1965 Cessna Skyhawk, 300 NAV/Com, 720 hrs. TT, black and white with orange trim, absolutely immaculate throughout, full gyro panel, new annual. Always hangared. \$7950. Ron Stevens, Pearland, 485-9417.

Two field-level tickets to the Houston Oilers-Dallas Cowboy football game to be played Aug. 31 in the Dome. Dave Cook, 7505 (no home phone).

New and used sailboats from \$325. Rent a Scorpion sailboat for a day or weekend \$6 per day. Bob Ward, 591-2182.

15' fiberglass boat with 50-hp Evinrude, complete with skis and trailer, no reasonable offer refused. John McNulty, 534-3792, Dickinson.

12-gauge double, European-made, 32-inch barrels, both full choke, 3" magnum. Winchester 94, manufactured before they started stamping out the parts, 30-30 caliber. Winchester 63 .22 automatic with high-power rifle scope. Colt Woodsman match target. .22 automatic pistol. Dick Grow, 944-9152.

4-passenger Stinson 108-2; 165 hp engine, Narco simplexer/omni, full gyro panel. Hangar 25, Clover Field, Friendswood, N-8280K. \$3000. Keith McClung, 591-3920.

Stud service—English pointers, top show quality, AKC reg., liver and white. Rita L. Heywood, Dickinson, 534-3979.

Hemistair Bonus Books—2 adult and 1 child, each with 1 gate admission, at EAA cost. (\$5.75 each for adult and \$2.50 for child). Opal Goodwin, 471-4786.

### WANTED

Much-used wood desk suitable for use in a workshop. Maximum length of 52 inches. D. W. Sherwood, 877-2909.

TV, Hi-fi components, working or not; also self-propelled lawn mower, edger, sailboat. Don Frisbee, 946-7193.

Will share driving or ride. Freeway Manor to MSC, 8 to 4:30. Don Frisbee, 946-7193.

Transmission for 1964 Pontiac—3 spd standard shift—Any GM 3 spd from approx 1962-64. Would consider 4 spd if price reasonable. L. James Price, HU 2-1664.

Utility or cargo trailer. Fred Humbert, 944-6628.

Two adult gate admission bonus books to Hemistair, Grissom, 932-4206.

A used adult wheelchair. E. J. Evans, RI 7-8726.

Set of 14-inch Cragar mags for Ford or Chrysler products. Will pay cash. Troy Waldron, Dickinson, 534-5860.

Partners interested in owning part of aerobatic biplane Stearman PT13D, can be seen at Tasco Aviation, LaPorte, N39531. Dick Grow, 944-9152.

Three bedroom, modern unfurnished home in Dickinson, close to Bayou. Needed by Sept. 1, will consider lease or option to buy. Don Heywood, Dickinson, 534-3979.

Riding mower—6 hp plus, must be in good condition. Don Heywood, 534-3979, Dickinson.

One boy's and one girl's adult size used bicycles. Carol Corley, 944-0854.

Winchester Model 12 slide-action 12-gauge shotgun. Prefer modified-choke barrel. Robert C. White, HU 2-7529 after 5.

Young couples needs a furnished apartment for about 4 weeks starting about August 15. Must return to school. Joe Woodcock, MI 3-1290 after 5.

## EAA Reps Sell Astros-Pirates Game Tickets

Tickets for the August 9 Houston Astros-Pittsburgh Pirates baseball game in the Harris County Domed Stadium are available from EAA representatives. Cost is \$4.50 each and includes dinner at 6 pm in the Domeskeller and the game at 7:30.

Tickets are available from the following persons/Bldg/Ext: Ed Stelly/15/3378. Bert Matthews/10/4711. Art Lizza/EAFB/7505. Ron Hayes/2/3901. Donna Bowers/16/4395 and Lecie Scott/419/2473.

## Investing Seminar Held Wednesday

Patricia Quinn Peterson, an account executive with Dempsey-Tegeler & Co., Wednesday will conduct an investment planning seminar for MSC-area people at the Sheraton Kings Inn at 7:30 pm.

Seminar sessions are free and are slanted toward individuals and families interested in planning and attaining a better financial condition. "Every major field of investment is covered," said Mrs. Peterson. "and advantages and best use of each are explained in terms the layman can readily understand."

## C-130 Modified For ER Flights

A Lockheed C-130 Hercules (Herky Bird) is currently undergoing modifications for use in the MSC earth resources program. On loan from the US Air Force, the aircraft will replace the Convair 240 used for the past several years as a part of the earth resources study program.

The four-engine turboprop aircraft will provide broader flight capabilities and additional space for scientific information.

The MSC Science and Applications Directorate Test and Operations Office is responsible for conducting aircraft flight studies to determine the feasibility of earth resource sensing techniques. The group works closely with "user" agencies and cooperating scientists and conducts flight over selected test sites across the country.

The C-130 will be outfitted with select photographic and sensing instrumentation and will be ready for flight by the second quarter of 1969. A Lockheed P-3A is also used in the program.

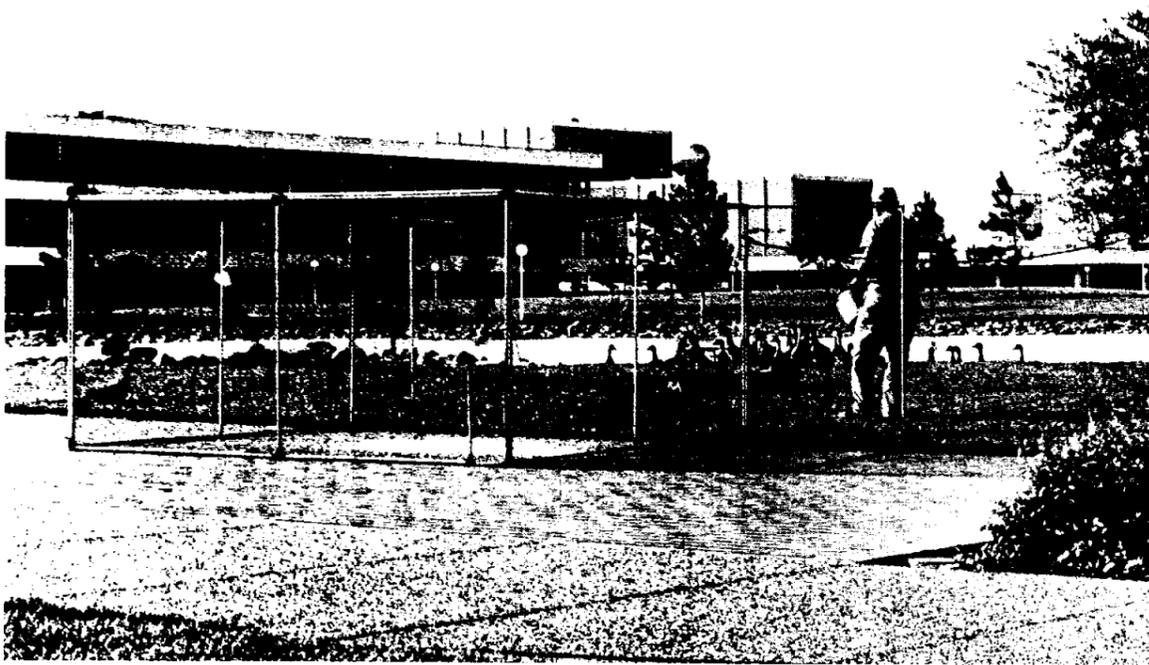
Reliable maid with own transportation for thorough house cleaning and some ironing one day a week in Clear Lake City. Jan Haney, 488-0706.

### LOST AND FOUND

Lost—male, blue point Siamese cat wearing yellow collar. In Beverly Hills area July 7. Jim Bates 944-4687.

Found—South side of Bldg 13: lettering aid for drafting, still has UofH price tag on envelope. Roy Parker, ext. 4701.

## You Have to Get Up Early to Outwit Ducks



**QUACKER MEETING**—Attempts were still under way at Roundup press time to capture and vaccinate the MSC duck colony after it was discovered that some of them had been killed by botulism. MSC groundskeepers and US Fish and Wildlife Service game management agents set up traps last week, but the ducks are wary of the hand that feeds them. A sort of embargo on duck feeding by employees has been called for the time being until the cause of the duck-killing disease can be learned, although it is difficult to look a green-headed Mallard in the eye and not be moved to share a sandwich or a cracker with him. Botulism is not contagious to humans but the disease can be transmitted to anyone eating an improperly-cooked diseased duck. MSC employees and visitors are cautioned to resist the ducks' panhandling tactics until the source of the disease has been identified.

## Five MSC Engineers Give Papers At Las Vegas EVA Conference

Five MSC engineers are among the more than 35 government and industry representatives who will make technical presentations at the Second National Conference on Space Maintenance and Extravehicular Activities August 5-8 at Las Vegas, Nev.

Crew Systems Division EVA Development Branch chief Larry E. Bell is the NASA conference cochairman with Robert G. Clodfelter of the USAF Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio.

CSD chief Richard S. Johnston heads the MSC contingent and will be the August 7 EVA conference luncheon guest speaker. CSD deputy chief E. L. Hays is chairman of the August 8 Protective Systems session.

OASF Deputy Associate Administrator Charles W. Mathews is guest speaker for the August 6 luncheon program. Mathews formerly was Gemini Program Manager at MSC.

## EAA Sponsors Teen Shindig

An EAA-sponsored teen dance August 16 will be held at the Holiday Inn Ambassador Ballroom from 8 pm to midnight. Music will be by the Ray Coker combo.

Tickets at \$1 each, including refreshments, are available from the following persons/Bldg/Ext: Gail Orsak/12/5551, Suzan Golden/30/5126, Carol Hopper/16/2401, Wanda Slack/45/3937, Helen Ragsdale/2/3885 and Martha Caballero/4/2421.

Technical papers to be presented and the authors/co-authors are:

"Inflight EVA for Mainline Apollo Missions," by Robert L. Bond and Jerry R. Goodman, MSC and Frank W. Parker, GE.

"NASA Programs for Advance Space Suit Develop-

ment," by Elton Tucker, MSC.

"Development of the Portable Environment Control System," by R. Norman Prince, MSC and William J. O'Reilly, AiResearch.

"Experiment M-509, Astronaut Maneuvering Equipment," by C. E. Whitsett, MSC.

## Flight Model ALSEP Accepted by Center

MSC has officially accepted delivery of the first flight system of the Apollo Lunar Surface Experiment Package (ALSEP) from the Aerospace Systems Division of the Bendix Corporation.

The July 23 formal acceptance at the Bendix Ann Arbor, Mich. plant was described by MSC Director of Science and Applications Dr. Wilmot N. Hess as a "very significant step forward." He said the first flight system represents one of the most important single set of experiments for lunar exploration for the next several years.

"ALSEP is the first step toward learning the environment and interior of the moon," said Hess. Other MSC officials at the on-schedule formal acceptance were S&AD Deputy Director for Projects Anthony Calio and Lunar Surface Project Office manager John W. Small.

The ALSEP system, a series of scientific experiment instruments, which Apollo crewmen will place on the surface of the moon, is designed to collect and transmit scientific data to Earth for one to two years after its emplacement on the lunar surface. It is composed of nine separate experiments which are scheduled to provide the scientific community with unprecedented knowledge of the lunar environment and interior—especially in the areas of geophysics, particles and fields and the lunar atmosphere.

The first flight system, which passed acceptance tests in mid-July at the Bendix plant, is composed of five experiments: passive seismometer, magne-

tometer, solar wind, spectrometer, and suprathreshold ion detector and cold cathode gauge.

The passive seismometer is a three-axis seismometer which will measure lunar tremors to study the moon's interior to its center—whether it has a crust and core and whether it is layered in structure like the earth. The principal investigator is Dr. Gary Latham, Columbia University's Lamont Geological Observatory. Dr. George Sutton of the University of Hawaii, Dr. Frank Press of Massachusetts Institute of Technology and Dr. Maurice Ewing of Columbia University are co-investigators.

The Magnetometer will measure the strength, direction and gradient of the moon's internal magnetic field as well as the interaction of the solar wind's magnetic field with the lunar body. Principal investigator is Dr. Charles P. Sonett of NASA Ames Research Center, and co-investigators are Dr. Jerry Modisette of MSC and Dr. Palmer Dyal of Ames.

The Solar Wind experiment will measure the energy, velocity, and direction of medium energy protons, electrons and alpha particles in the solar wind as they arrive at the moon. Dr. Conway W. Snyder is principal investigator and co-investigators are Dr. Douglas Clay and Dr. Marcia Neugebauer all of the Jet Propulsion Laboratory.

The suprathreshold ion detector (SIDE) will measure the temperature and density of positive ions existing in the moon's ionosphere by sampling ions in a wide range of energies. The cold cathode gauge experiment (CCGE), will determine the pressure of neutral particles by measuring the density of the ambient lunar atmosphere. Principal investigator for SIDE is Dr. John Freeman of Rice University, CCGE principal investigator is Dr. Francis Johnson of the Southwest Center for Advanced Studies with Dallas Evans of MSC as co-investigator.

The Apollo crewmen will deploy the first flight system, which will be carried to the Moon on the Lunar Module, in a prescribed arrangement. Each experiment will be connected to a central station which will collect and transmit data to the Manned Space Flight Network (MSFN). Telemetry data from the ALSEP will be received by various MSFN sites and relayed to Mission Control Center-Houston. The MSFN can command the ALSEP to perform various functions as required by the principal investigators.

Electric power for the ALSEP will be furnished by a radioisotope thermoelectric generator (RTG) which was developed by the Atomic Energy Commission. It will provide adequate power for up to two years.

The first flight system is part of the overall Bendix contract which is currently valued at approximately \$30-million.

## Venusian Atmosphere Expert



**SEMINAR FULL HOUSE**—The MSC Auditorium was filled July 23 for the Science and Applications Directorate seminar on the "Atmosphere of Venus" at which Nobel Prize winner Dr. Willard F. Libby was the principal speaker. Chatting with Libby in the lobby (inset) are, left to right, MSC Deputy Director George S. Trimble, Dr. C. J. Huang, University of Houston associate dean of engineering and codirector of the NASA-ASEE summer faculty program, Libby, and MSC Lunar and Earth Sciences Division chief Dr. P. R. Bell.