



# ROUNDUP

NASA LYNDON B. JOHNSON SPACE CENTER

HOUSTON, TEXAS

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Friday, Jan. 7, 1977

## Soviet Moon sample under study at JSC

Several grams of Moon soil collected last August by an unmanned Soviet spacecraft have been transferred to JSC for analysis by American scientists.

A three-member U.S. scientific delegation returned Dec. 16 from Moscow where they examined the 2-meter (6-foot)-long core of Moon soil collected and brought to Earth by the Luna 24 spacecraft last August.

*This sample could contain the first material ever returned that is directly related to a feature on the Moon's far side.*

The soil, from a region of the Moon called Mare Crisium (Sea of Crises), will be the third Russian sample obtained by American scientists in exchange for material collected by Apollo astronauts from other places on the Moon.

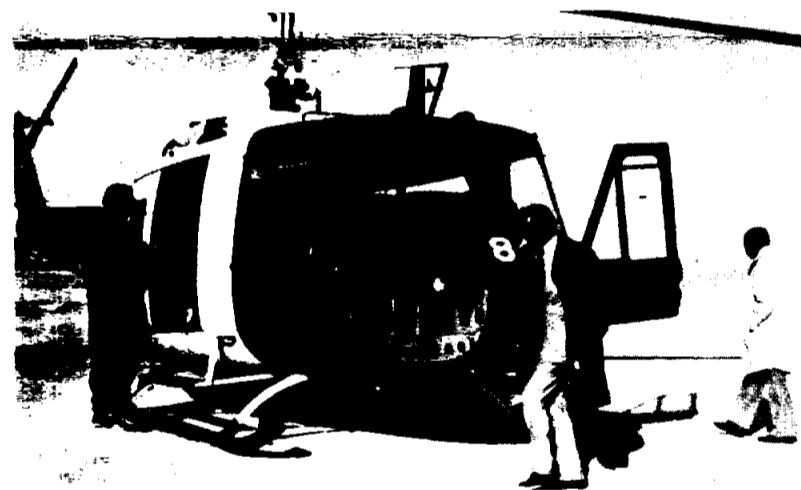
Arrival of the Russian sample at the Lunar Sample Curatorial Facility here is generating excitement among the several hundred sci-

entists who are involved in an active program of lunar sample research.

"The Luna 24 sample is unique in two ways," says Dr. Noel Hinners, NASA Associate Administrator for Space Science. "First, it comes from a region of the Moon from which we have never obtained samples. Even more important is the fact that Luna 24 obtained a complete core down to a depth of 2 meters (about 6 feet) so we have a new slice to add to the three deep cores collected by the Apollo Program."

The historical record contained in the Luna 24 core may go back several hundred million years. From studies on the larger, deeper (3 meters or about 10 feet) cores of lunar soil returned by the Apollo 15, 16 and 17 missions, scientists expect that the Luna 24 core will also contain many different soil layers, each one representing the excavation of a small impact crater somewhere on the Moon.

*(Continued on page 4)*



WHITE SANDS VISIT - JSC Director Dr. Christopher C. Kraft Jr. is shown here (at nose of helicopter) while on a recent visit to the Northrop Strip at the Army's White Sands Missile Range, Las Cruces, N. M. Two Shuttle Training Aircraft were making simulated Orbiter landing approaches at the strip when Kraft and other JSC officials inspected the facility. NASA's White Sands Test Facility adjoins the range.

## JSC group visits White Sands during Shuttle training flights

By Bruce Bennett

Center Director Dr. Christopher C. Kraft Jr. led a group from JSC on a visit to White Sands Missile Range (WSMR), N.M., last month where Shuttle Approach and Landing Test training was underway.

Two Shuttle Training Aircraft were making simulated Orbiter landing approaches on WSMR's Northrop Strip, a graded dry lake bed striped to look like an Orbiter landing strip.

The party had spent several hours at NASA's adjoining White Sands Test Facility, where the visitors inspected test facilities, received briefings and conferred with NASA and contractor employees.

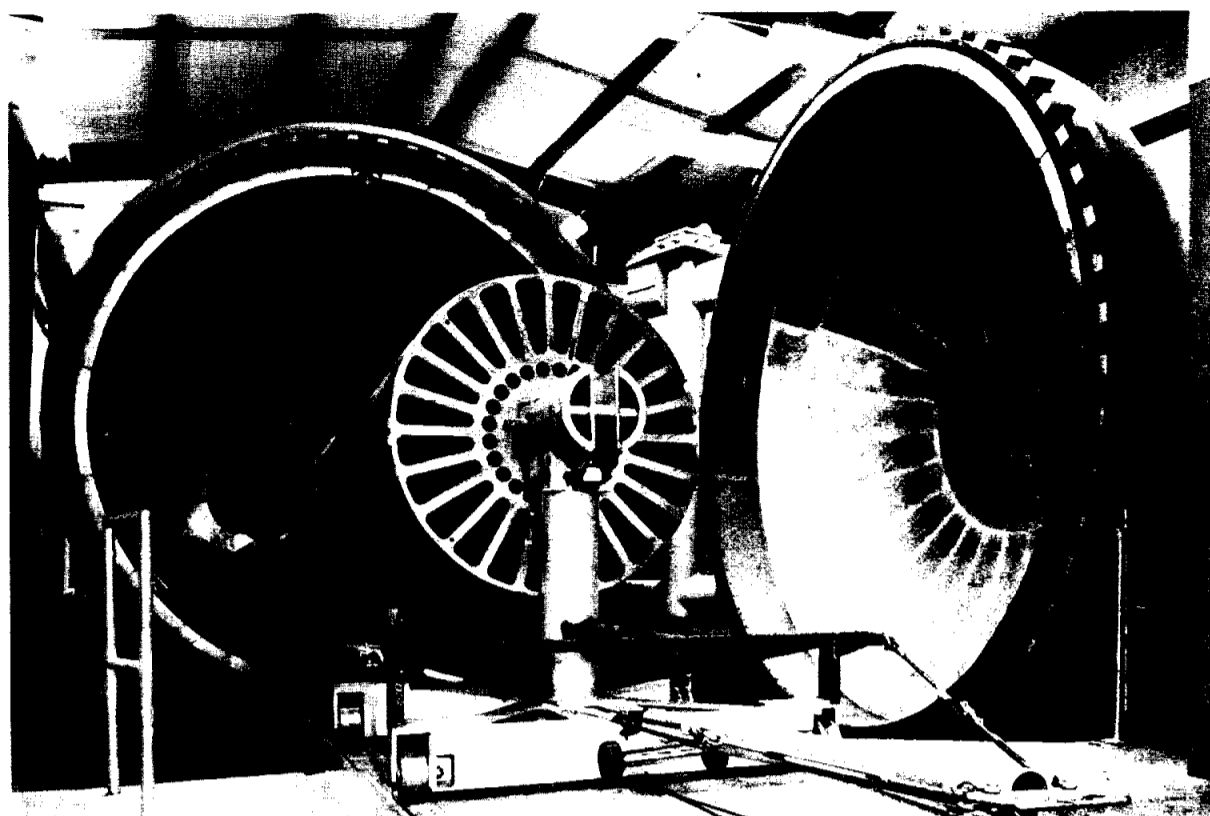
After a luncheon meeting, Kraft addressed all employees in the WSTF auditorium.

Favorable conditions make White Sands a likely site for a spaceport of the future, the JSC director said.

WSMR will be an advantageous site for a spaceport because of "its higher elevation and lower humidity as compared with coastal launching and landing sites," he said.

Kraft anticipated spaceports across the nation to be similar to the seaports of today.

The Tracking Data and Relay Satellite System to be located at White Sands will centralize NASA's



SOLID ROCKET MOTOR - Preparations for casting segments of the Space Shuttle's Solid Rocket Motor are under way at the Thiokol Corp., Brigham City, Utah, prime contractor to NASA for the motor. A mandrel, the core around

which propellant will be poured, is shown being inspected following application of a Teflon coating. The coating is needed to keep the propellant from sticking to the mandrel.

## Booster assembly firm chosen

NASA has selected United Space Boosters Inc. (USBI) of Sunnyvale, Calif., as the assembly contractor for the Space Shuttle Solid Rocket Booster.

A cost-plus-award-fee contract has been negotiated for \$122 million which includes the maximum potential award fee. The contract is for six design, development, test and evaluation flights which extend through March 1980 plus options for 21 operational flights extending into 1982.

The booster assembly contract covers all necessary activities at NASA's Marshall Space Flight Center and Kennedy Space Center.

The first of six orbital flight tests is scheduled for the second

quarter of 1979 and operational flights begin in 1980.

USBI will be responsible for assembly, checkout and refurbishment, stacking, integrated checkout, launch operations and post-launch disassembly of the boosters.

The Space Shuttle is to be launched using its three main engines and two boosters operating

together. The boosters, upon burn-out at an altitude of about 43.5 kilometers (27 miles), will be separated and will descend by parachute to the ocean for retrieval and reuse. The boosters are designed for use 20 times.

USBI is a wholly-owned subsidiary of United Technologies Corp.

## McDonnell Douglas will produce SSUS

A solid propellant upper stage will be developed as a commercial venture, to be available for use in future Space Shuttle missions. Under an unusual agreement between NASA and McDonnell Douglas Corp., the firm will build and market the stage, using its own funding and initiative.

After their insertion into low Earth orbit by the Shuttle, payloads weighing up to 2,450 pounds would be carried by the upper stage into a transfer orbit, where a kick motor would insert them into a circular, geosynchronous orbit 22,300 miles above the Earth.

NASA will not knowingly fund or formally solicit development of competitive or alternate upper stage systems.

McDonnell Douglas, Huntington Beach, Calif., will meet the NASA schedule for Space Shuttle operations so that NASA's assurances to Space Shuttle users will be met.

Under the terms of the agreement McDonnell Douglas may market the upper stage hardware and services either directly to users or through NASA. NASA is not committed to purchase any upper stage

hardware or services from McDonnell Douglas.

The stage involved is called the Spinning Solid Upper Stage (SSUS). A similar stage which would be used as an upper stage with the McDonnell Douglas Delta launch rocket would be called Payload Assist Module (PAM).

The Delta rocket presently is the workhorse of NASA's expendable launch vehicle program and has carried most of the communications and weather satellites now operating in geosynchronous orbit. The Delta, and other expendable launch vehicles, would be phased out by NASA after its Space Shuttle becomes operational in the 1980s.

The agreement provides that McDonnell Douglas will undertake and fund the development of SSUS/PAM on a commercial basis at no direct cost to NASA or the U.S. Government except when the Government might be a SSUS/PAM user or buyer.

The SSUS/PAM will be designed so that four Delta-class spacecraft can be carried in the Space Shuttle cargo bay at launch.

## NASA seeks vibration test system

NASA's Marshall Space Flight Center has requested industry proposals for the design and fabrication of a suspension system for mated vertical ground vibration testing of the Space Shuttle.

The job is expected to require 8-1/2 months from the date a cost-plus-fixed-fee contract is awarded.

The suspension system is to be used in a former Saturn 5 dynamic test stand converted for Space Shuttle vibration testing at the Marshall Center.

Major items to be provided under the contract include an overhead suspension truss, two pneumatic spring trusses, two cable support systems and special handling equipment.

The Shuttle will be tested in two configurations, launch and boost. This suspension system contract pertains to test equipment associated with testing in the boost configuration only, which consists of Orbiter and External Tank.

## Lockheed signs JSC contract

The Johnson Space Center has signed a contract with Lockheed Electronics Co., Inc. for engineering, scientific and computing center support services.

Services performed at JSC include computing center support for Space Shuttle, Large Area Crop Inventory Experiment (LACIE) and the Earth Resources Aircraft Program. The cost-plus-award-fee contract is valued at approximately \$29.9 million.

## Clinic offers breast exam instruction

The JSC Clinic and the American Cancer Society will present two instruction sessions on breast self-examination at 10 a.m. and 2 p.m. Jan. 12 in the Bldg. 30 auditorium.

These sessions will include a film, literature and a question and answer period. A physician from the clinic will be present along with Betty Miklos of the local American Cancer Society.

Knowing the proper methods of self-examination greatly increases the possibility of early detection. Cancer of the breast found early is one of the most curable forms.

All female employees at JSC are invited to attend this program.



CONTRIBUTOR THANKED - Richard W. Underwood, center, of the Photographic Technology Division, receives the "Backup Crew Award" of the Edward H. White II Youth Center from Frank Smith, center director. Looking on is Kenneth B. Gilbreath, deputy director of Center Operations at JSC. Underwood has contributed to the youth center various honorariums he has received as a speaker for NASA.

## Youth center lauds Richard Underwood

Richard W. Underwood of the Photographic Technology Division was presented a "Backup Crew Award" last month for his contributions to the Edward H. White II Youth Center.

Underwood, a frequent volunteer speaker for NASA through the JSC Speaker's Bureau, has donated to the youth center various honorariums he has received as a result of his speaking engagements.

The "Backup Crew Award" was recently created to acknowledge ex-

ceptional contributions to the program of the center.

Presenting the certificate to Underwood Dec. 13 was Frank Smith, director of the Edward H. White II Youth Center. Also present were Kenneth B. Gilbreath, deputy director of JSC Center Operations; Thomas L. Moser, youth center board member; the Rev. Lloyd L. Giles, youth center executive director, and Richard E. Thompson, deputy chief of the JSC Photographic Technology Division.

## Judy Janner named JSC top secretary

Judy V. Janner of the Software Systems Branch, Ground Data Systems Division, was selected JSC Outstanding Secretary of the Month for December.

The award nomination was signed by Janner's branch and division chiefs and Data Systems and Analysis Director Howard W. Tindall Jr.

As Software Systems Branch secretary, Janner serves three sections with diverse functions and 21 technical employees.

"Her competence and exceptional ability can be summarized by saying that she handles the often unusually heavy workload of the branch with apparent ease, meeting or surpassing established schedules and deadlines," the recommendation stated.

Janner is proficient in operating the Administrative Terminal System (ATS) and was called on, beginning in March 1976, to support the Data Processing Branch when the division needed extra ATS assistance to handle Source Board activities.

"Mrs. Janner cheerfully undertook a long and arduous task for the Data Processing Branch, transforming volumes of rough drafts, hand written pages, etc., into finished documentation ready for reproduction and distribution," her supervisors reported.

"This she has done with her usual high degree of competence, meeting all documentation deadlines while assuring that none of her essential branch duties were remiss," they said.



Judy Janner

## NASA achieves second perfect launch record

NASA achieved a perfect score in 1976 in its 16 launch attempts.

This marks the second time in its 19-year history that the space agency achieved success in all of its launches in a single calendar year. In 1972 NASA was successful in all of its 18 launch attempts.

In keeping with the trend over the past several years, most of the launches were for organizations other than NASA.

Twelve were paid for by other government agencies, private corporations, and foreign countries. Two were for NASA missions and two were for cooperative scientific programs in which Germany and Canada supplied spacecraft, which were launched by NASA for the opportunity to share the resulting science.

The launch schedule also indicates the growth in the ability of man to effectively use space for his own direct benefit, since 14 of the 16 launches were direct applications—11 communication satellites, one geodetic, one navigation and one meteorological satellite.

NASA sources state that results such as the perfect record in the Bicentennial year resulted from

teamwork on the part of the nationwide government-industry space team.

Participating NASA organizations are in Florida, Virginia, Maryland, Ohio and Washington, D.C. The major rocket contractors supplying the launch vehicles are in California, Colorado and Texas.


Eleven vehicles were launched from the Kennedy Space Center, Fla., four from Vandenberg Air Force Base, Calif., and one from Wallops Flight Center, Va.

(See chart, page 3)

## Holman rites held Dec. 15

Funeral services were held Dec. 15 for David N. Holman, technical editor, Management Services Division, who died Dec. 14 at Clear Lake Hospital. He was 52.

Holman, of 1779 Saxony Lane in Nassau Bay, was a native of Gainesville, Texas. He was a former reporter for the Clear Lake News Citizen and a past president of the Society of Technical Communicators.



## ROUNDUP

NASA LYNDON B. JOHNSON SPACE CENTER

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Editor: Richard Finegan      Photographer: A. "Pat" Patnesky

## Civilian astronaut applicants total 904

The Astronaut Candidate Program Office reported Dec. 28 that 904 applications have been received for civilian astronaut pilot and mission specialist candidate positions. Of those applicants, 98 are women. Of a total 10,985 applications

and announcements mailed out by request, 205 went to JSC employees.

Civilian applications must be postmarked no later than June 30, 1977. For information, write the Astronaut Candidate Office, AHX.



**35 YEARS SERVICE**

  
Ashley

  
Baker

  
Carter

  
Hart


  
Pittman

  
Smith




**30 YEARS SERVICE**

  
Cohen


  
Engel

  
Goodwin

  
Griggs

  
Lee

  
Leezer

  
Roll

  
Slayton

  
Virden

  
Waldron

## 510 years total service

Length of Service Awards were presented last month to 17 JSC employees whose total government service exceeded half a century. Receiving 35-year commendations were Edward Ashley, Cyril Baker, Dan Carter Jr., Richard Hart, William Pittman and Earl Smith. Getting 30-year awards were Jack Cohen, Chris Critzos (no photo), Jerome Engel, Burney Goodwin, Donald Griggs, William Lee, Robert Leezer, Richard Roll, Donald Slayton, N. A. Virden and Lesley Waldron. Another 18 employees received 25-year awards.

# EAA ATTRACTIONS

## TICKETS

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

**Houston Aeros** - EAA discount gift coupons may be exchanged at the Summit box office for "live" tickets on the night of the game. A \$6.50 coupon gets you an \$8 ticket, \$5.50 gets a \$7.50 ticket and \$4 gets a \$5 ticket. Aeros play San Diego, Jan. 11; Birmingham, Jan. 14; Edmonton, Jan. 16; St. Paul, Jan. 21 and San Diego, Jan. 23.

**ABC Interstate Theaters** - \$1.50 admission tickets.

**Dean Goss Dinner Theater** - Comedy production, *Opal's Baby*, \$16/couple. Tickets available every night except Monday, Saturday.

**Disney Magic Kingdom Club** - Free membership cards.

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

## NEW DANCE CLASSES

JSC classes in ballroom dancing will be held every Wednesday at 6:45 p.m. and 8:15 p.m. at the Gilruth Recreation Center starting Jan. 26.

EAA members, associate members and guests are invited to join. Cost is \$37/couple for 10 weeks. Instructors are Rae and Bob Calvert. For information, call Bill Simon, X-4027.

## REC CENTER

Contractors: 1977 membership cards are now available at the Gilruth Center. All NASA-badged contractors are eligible. There is no charge. Bring badge and Apply Mon-Fri, 9 a.m. to 2:30 p.m.

## SWINGERS WANTED!

Men and women of JSC and on- or off-site contractors are wanted to join in an EAA-sponsored activity for the new year.

This club will visit a variety of locations around Houston, beginning about mid-February, and offers fun, prizes, fun, trophies, fun, merchandise and more FUN for its members.

Cost is estimated between \$28 and \$30 per year per swinger. Call Al McIntyre, X-2254, for a registration blank and join the JSC Golf Club - they're some of the nicest swingers around.



## RODEO TICKETS

The EAA has acquired a large block of tickets to four performances of the 1977 Houston Livestock Show and Rodeo.

All tickets are \$5.50 each. Headlining performers and dates are: Mac Davis, Feb. 26; Mel Tillis, March 1; Donnie and Marie Osmond, March 5, and Charlie Pride, March 6.

## B LEAGUE

The Chugs beat the Brewers for the championship 47-34 in a Dec. 31 playoff game.

## 1976 Launch Record

Payload	Date	Launch Vehicle	Launch Site	Reimbursable	Remarks
Helios-2	Jan 15	Titan III Centaur	Canaveral	No	Cooperative with Germany
CTS	Jan 17	Delta	Canaveral	No	Cooperative with Canada-communications satellite
Intelsat IV-A (F-2)	Jan 29	Atlas Centaur	Canaveral	Yes	International communications satellite for Comsat Corporation
Marisat-1	Feb 19	Delta	Canaveral	Yes	Communications satellite for comsat General Corp.
RCA Satcom-2	Mar 26	Delta	Canaveral	Yes	Communication satellite for RCA
NATO III-A	Apr 22	Delta	Canaveral	Yes	Communications satellite for NATO
Lageos-1	May 4	Delta	Vandenberg	No	Laser ranging geodetic satellite
Comstar-D1	May 13	Atlas Centaur	Canaveral	Yes	Domestic communications satellite for Comsat General Corp.
USAF Test	May 22	Scout	Vandenberg	Yes	USAF scientific payload
Marisat-2	June 9	Delta	Canaveral	Yes	Communications satellite for Comsat General Corp.
Relativity	June 18	Scout	Wallops	No	NASA gravitational probe/suborbital
Palapa-1	July 8	Delta	Canaveral	Yes	Indonesian communications satellite
Comstar-D2	July 22	Atlas Centaur	Canaveral	Yes	Domestic communications satellite for Comsat General Corp.
NOAA-5	July 29	Delta	Vandenberg	Yes	Earth observation (weather) satellite for NOAA
US Navy TIP	Sept 1	Scout	Vandenberg	Yes	Transit navigation satellite
Marisat 3	Oct 14	Delta	Canaveral	Yes	Communications satellite for Comsat General Corp.

# Photo exhibit opens tonight

The JSC Photo Club, IBM Photo Club and Houston Photographic Society are opening a photo exhibition tonight, Jan. 7, from 7:30-10 p.m. at the Freeman Memorial Library in Clear Lake City.

Members from all three organizations will be present for the opening night event. Prints will remain

on display at the library until Feb. 2.

The Houston club will be exhibiting its recently-judged "Print-of-the-Year" winners in black and white and color categories. The JSC and IBM clubs will display selected members photographs.

This exhibit opening will be the

regular January meeting of the JSC Photo Club. Anyone interested in learning about the participating organizations is welcome to attend.

The next scheduled JSC club meeting is Thursday, Feb. 3, at 7:30 p.m. in Room 206 of the Gilruth Recreation Center.

# Roundup Swap Shop

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

## CARS & TRUCKS

- 64 Grand Prix. Good work car. 1st \$200 cash. Poindexter, 474-2203.
- 71 Toyota Wagon. Air, radio, heater, 4-spd, 2-dr, good cond, good tires. Leo, 482-2020 after 6.
- 72 Pontiac Bonneville. 4-dr, air, pwr, radio, vinyl top, good cond. \$1,400. Rowley, X-3751 or 643-4859.
- 74 VW Superbeetle. Very good cond. \$1,600. Hamilton, X-4555 or 472-2118 after 5.
- 76 Chevy Blazer. 16K mi, air, radio, post-trac, bronze w/saddle int, clean. Must sell. Beverly, X-5566 or 643-3792.
- 74 Honda Civic Hatchback. Radio, auto, air. \$1,995. Bullock, X-3681 or 488-1042.
- 71 Ford Mustang. Blue w/white vinyl top, V8, auto, air, pwr, radio. \$1,850. Hall, X-4511 or 748-2464 after 5.
- 72 Chevy Malibu. Pwr, air, AM/FM stereo, radials, vinyl top, trlr hitch. \$1,950. Wylie, X-4581 or 334-4175.

## PLANES

Cherokee 140. 1972, 4 seat, air cond, MK 12-360, transponder, 2600 TT, 600 SMOH. \$9,500. Fisher, X-4488 or 331-3954.

## PETS

Reg German Shepherd pups. Ready mid-Jan. \$75. Weiss, X-6156 or 453-1956 after 6.

## MUSICAL INSTRUMENTS

Snare drums, marching or stand type. XInt cond w/2 prs sticks. \$30. 333-3457.

## STEREOS & CAMERAS

2 Acoustic Research-17 speakers. \$80 pr. Lake, X-3286 or 523-2137.  
Pentax 35 mm SLR camera w/clip-on lite meter, carry case, Strobolar elec flash w/leather case. 1961 H-1 model. \$35. Dorland, 488-3258.

## HOUSEHOLD ARTICLES

Reg full size Hollywood bed. Good cond. \$75. Zill, 559-2136.  
Apt size Whirlpool washer, reg size Whirlpool dryer, white, good cond. \$225. 946-9192.

## MISCELLANEOUS

Fish aquarium, 5-1/2 gal tank w/many acces, \$12. Movie screen 40X40 Trypoid Silver Lenticular, \$10. Williams, X-5830 or 477-2622.  
Set of 4 sport wheels. 15X8 in, 6 lugs, white spokes, steel. Sacrifice at \$125. 488-1967.  
Bal Harbour tennis membership. Moving, make offer. Downs, X-4405.  
VW parts. Old front end, 2 snow tires, 2 reg tires, wheels, engine & pts, starter, etc. All 6V, cheap. Wells, X-5293 or 554-2871.

Tennis rebound net. 6X8 ft area, xInt cond, ideal for home practice. \$25. Sessions, 482-1888.

## WANTED

Conscientious male to share house in Wedgewood. No lease. \$135/mo. Jeff, 482-5393 or X-6355.  
Need ride or riders for carpool forming from bay area (Lg Cty) to Med Center area (St Lukes), 7:30-4. Wells, X-5293 or 554-2871.  
Slide projector in good cond wanted. Jeff, X-6355 or 482-5393.  
Gas chain saw, preferably at least 14 in. White, X-2921 or 488-1695 after 5.  
Buy or trade American Flyer or Lionel trains & acces, working or not. 334-3182.  
Firefighters needed. Men & women adult residents of Clear Lake City to join CLC Volunteer Fire Dept. Rewarding community service. You will be trained & equipped. Call 488-0023 anytime.

## LOST

Small pocket knife lost. Made by Case w/"Coke" inscription on handle. Kilbourn, X-4401.

## LATE ENTRIES

Bushnell Custom Binoculars. 9X36, xInt cond. \$140 value, reduced to \$85. 471-0454, LaPorte.  
65 Chevy V8. 4-dr, 76K mi, new tires, 1 owner. \$300. Clyatt, 944-3725.

1	2	3	4	5	6	7	8
E				P	A	R	E
9	V			10	A	G	A
11	P	M	S	12	T	R	O
			13				
14	15	16			17	18	19
C	A	R	P	E	N	T	E
20	R			21	E	I	R
22				23	R	E	N

# JSC Crossword

## DOWN

- Space walk
- Deface
- Doctrine
- Experimental launch site (2 wds)
- What Pratt was to Whitney
- Gone by
- Jogged
- Unit of energy
- Metatarsal phalange
- Taxi
- To be (3rd person pl.)
- Tin Tin
- Fasten
- Sea eagle
- Sanguine

## ACROSS

- Give off
- Trim away excess
- Holds flowers
- Culture medium (biol.)
- Flew first docking mission
- Small child
- He overshot splashdown
- Operatic solo or range aircraft for Apollo
- Ireland
- Cause to curve
- Tear apart violently

(See answers, page 4)

# Indian-owned firm gets exclusive patent

NASA has awarded an exclusive patent license to Owen Enterprises Inc., Wilmington, Calif., for production of a unique solar energy concentrator that focuses the Sun's rays from almost any angle without the need for a Sun tracking mechanism.

The device was invented by Dr. Katsunori Shimada of the Jet Propulsion Laboratory, Pasadena, Calif., and patented by NASA.

Owen Enterprises Inc., is an American Indian-owned firm. Final assembly of the device will be accomplished at facilities on the Rincon Indian Reservation near Escondido, Calif.

Under terms of the patent license agreement, Owen Enterprises will invest \$200,000 to develop the device for the market. In addition, after production begins in about six months, the firm will pay a one per cent royalty of its gross sales to the U.S. Treasury.

The solar energy concentrator is a long, narrow device consisting of a special arrangement of multifaceted Fresnel lenses that magnify the Sun's energy 10 times, much like a magnifying glass.

Each facet of the lens acts as a small prism which concentrates solar energy on one of a series of heat collector elements. The concentrated sunshine heats a fluid located in channels beneath the lenses.

The fluid, water, ethylene glycol or other suitable liquid, is released through a thermostatically controlled valve when the proper temperature is reached. A series of the devices can be hooked together, depending on the specific energy requirements of a structure.

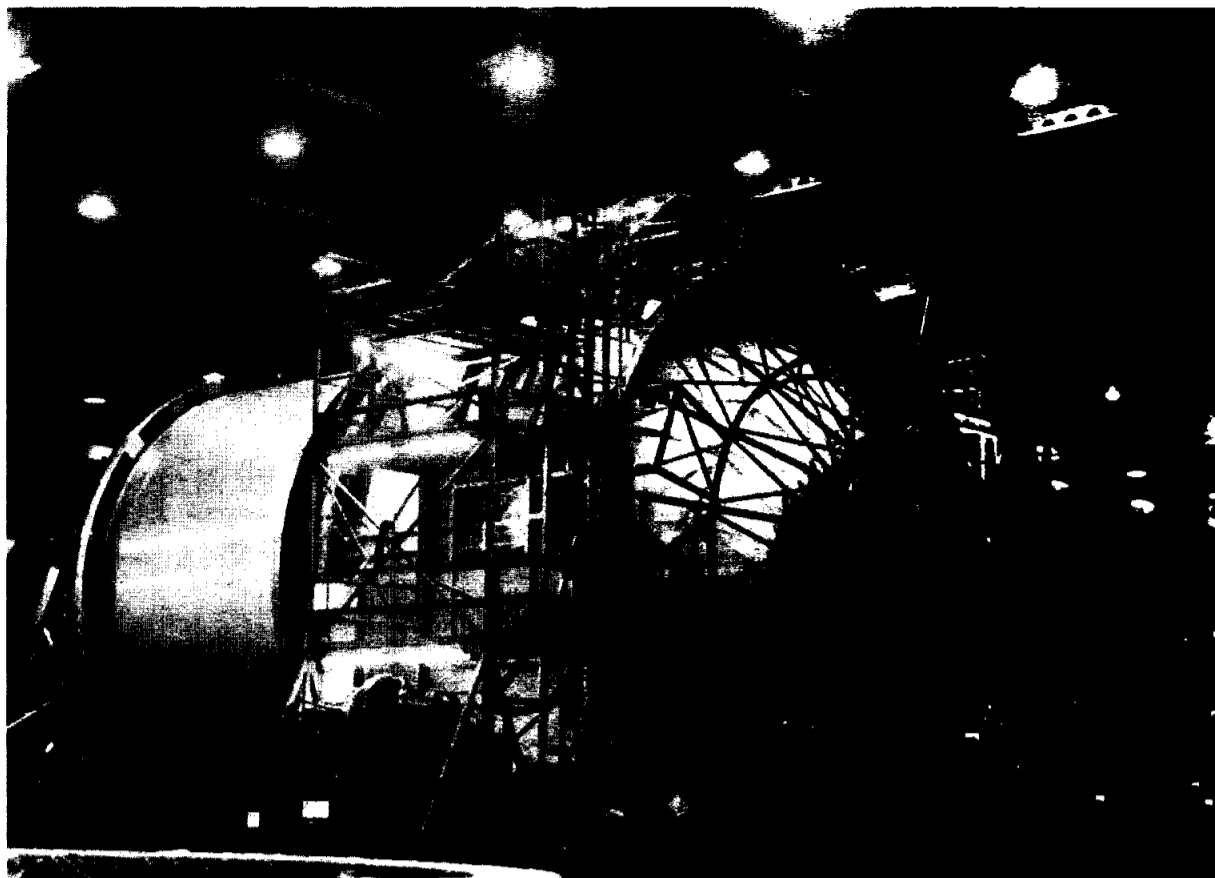
With its concentrating capability of 10 to one, the solar energy concentrator has a much higher efficiency than solar collector units now on the market. It can be used for residential, commercial and industrial applications.

Owen Enterprises Inc. is located at 436 North Fries Avenue, Wilmington, Calif. 90744.

NASA does not endorse commercial products developed as a result of its Patent Licensing or Technology Utilization Programs but it does encourage the widest possible use of its technology.

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WASHINGTON, D.C. - Using a new radar system provided by NASA, planetary scientists have obtained information revealing what may be a lava flow the size of Oklahoma on the planet Venus.



LIQUID HYDROGEN TANK - A step in the assembly of the External Tank (ET) for Space Shuttle is fabrication of the liquid hydrogen tank, the larger of two tanks in the ET.

The giant tank is shown here being assembled in the LH2 Tank Assembly Trim and Weld Fixture at NASA's Michoud Assembly Facility.

# NASA reassigns pre-Shuttle hardware

NASA is modifying some of the Saturn-Apollo equipment and facilities used in the Apollo, Skylab and Apollo Soyuz programs for use in future space programs and is taking steps to dispose of the remaining Saturn-Apollo hardware that has no future application.

The move marks the transition to a new phase of the space age: from an era of exploring and probing the secrets of space to a time of emphasis on exploiting near-Earth space for the benefit of this planet's inhabitants.

The action also marks the transition of the U.S. capability to carry out manned missions in space from expendable space vehicles to that of

the reusable Space Shuttle.

By disposing of the remaining hardware, NASA will eliminate storage costs, free storage space and make facilities available for ongoing programs.

Since April 1975, NASA has maintained its inventory of remaining Saturn-Apollo flight hardware in minimum cost storage so as to be able to restore it to flight condition if desired.

Since that time the backup Skylab Workshop and the Apollo Soyuz backup docking module have been transferred to the Smithsonian Institution's National Air and Space Museum. Twenty-two H-1 rocket engines from Saturn 1B stages have

been transferred for use in NASA's Thor-Delta vehicles.

NASA still has two Saturn 5 vehicles, flight stages from two Saturn 1B vehicles, one complete Apollo Command and Service Module and one partially assembled Command and Service Module.

The Saturn 5 is the rocket that launched NASA's Apollo missions and - in a two-stage version - also launched the Skylab workshop into Earth orbit. The Saturn 1B launched several unmanned Apollo missions and the manned Apollo 7, three Skylab manned missions and the Apollo portion of the Apollo Soyuz mission. The Apollo Command and Service Modules are simi-

lar to the spacecraft used in the Apollo, Skylab and Apollo Soyuz missions.

Much of the Saturn-Apollo hardware is expected to be turned over to the Smithsonian Institution.

Other equipment used in the Saturn-Apollo program is being screened for possible use in the Space Shuttle or other programs.

Launch facilities at the Kennedy Space Center and test facilities including those at the Marshall Space Flight Center, the National Space Technology Laboratories at Bay St. Louis, Miss., and other locations are being modified for use in the Space Shuttle program.

# Soviet Moon sample under study at JSC...

(Continued from page 1)

Measurements on the Apollo cores have shown that some of these layers were deposited as much as a billion years ago, and each layer preserves traces of exposure to the Sun and cosmic rays during the Moon's past. The Luna 24 core will make it possible to extend this lunar history into a once-unknown part of the Moon.

Study of the Luna 24 sample will test the belief that Mare Crisium is covered by dark-colored lava flows that poured out onto the Moon more than 3 billion years ago. The sample will also provide essential geological and chemical information to add to the data accumulated from samples collected by the six manned Apollo and two unmanned Luna landings.

An important aspect is the possibility the sample contains particles of the blanket of material thrown out of the huge crater Giordano Bruno, about 1,200 kilometers (745 miles) away, according to Dr. Michael Duke, curator of lunar samples.

This would be significant since Giordano Bruno crater is on the Moon's far side, an area extensively

mapped from orbit but never actually sampled. This sample could contain the first material ever returned that is directly related to a feature on the Moon's far side.

The Luna 24 core also may preserve a potentially exciting record of the past history of the Sun. The soil, formed by meteorite bombardment, has been exposed for millions of years to all the solar and cosmic radiation that strikes the surface of the airless Moon.

Trapped in the soil fragments are actual atomic particles blasted out of the Sun millions of years ago. By comparing the Luna 24 core with similar cores returned by the Apollo missions, scientists hope to obtain new information about how the Sun has behaved in the past.

The Luna 24 samples also will provide a test of predictions made by observing the unexplored regions of the Moon through Earth-based telescopes. Scientists who have made spectral studies of the light reflected by lunar samples predict that the Luna 24 material will be a basalt lava with a low titanium content, much like the lavas returned by the Apollo 12 and Luna

16 missions. If these predictions turn out to be correct, scientists can obtain better chemical analyses of the Moon from telescopic observations or from instruments in orbit around the Moon.

The small amount of sample available presents no problems for getting out the necessary scientific information. "The Apollo Program helped develop many methods for getting a lot of information out of very small samples," said Dr. Bevan French, chief of NASA's Extraterrestrial Materials Research Program. "With the methods now available, we can produce hundreds of chemical analyses from a single tiny crystal or determine the age of rock fragment smaller than an aspirin tablet." Many of these techniques are now being routinely applied to obtain exciting new information from meteorites and terrestrial deep-sea basalt samples, French said.

The Luna 24 spacecraft was launched from the Soviet Union on Aug. 9 and landed on Mare Crisium on Aug. 18. (Mare Crisium is visible to the unaided eye as a small dark spot on the upper right-hand edge of the Moon.)

The robot spacecraft sent a thin, flexible, hollow drill about 6 feet into the ground, obtaining a complete section of the lunar soil layers. The drill was then rolled up into a sample container about the size of a basketball. The Luna 24 spacecraft blasted off the Moon on Aug. 19 and the sample chamber landed safely on Aug. 22 in western Siberia.

The core is now being studied in the Vernadsky Institute of Geochemistry and Analytical Chemistry in Moscow, the Soviet Union's leading geoscientific center and repository for their lunar samples.

Besides Duke, members of the American scientific delegation who were in Moscow this week to examine the Luna 24 core are Prof. Gerald J. Wasserburg of the California Institute of Technology and Dr. Charles Simonds of the Lunar Science Institute here.

Russian scientists have been invited to describe their analyses of the Luna 24 samples at the 8th Annual Lunar Science Conference, to be held in March in Houston. These conferences, which have been

held yearly since the first Moon rocks were obtained by the Apollo program in 1969, are a major event in the presentation of lunar and planetary science results.

The agreement under which the American and Russian lunar samples are exchanged was negotiated between NASA and the USSR Academy of Sciences in 1971. Already analyzed by American scientists have been samples from the Russian Luna 16 and Luna 20 probes, which returned material from the Moon in 1970 and 1972.

JSCrossword answers											
(See puzzle, page 3)											
E	R	G	●	R	E	D					
R	A	N	●	E	R	N					
A	G	O	●	T	I	E					
P	A	R	T	E	R						
●	●	T	O	E	●	●					
T	E	S	T	P	A	D					
I	S	M	●	R	I	N					
M	A	R	●	A	R	E					
E	V	A	●	C	A	B					