

Space News Roundup

Vol 26 No 25

December 18, 1987

National Aeronautics and Space Administration

Happy Holidays

Dear colleagues,

This holiday season, more than any other in recent years, is a time for our JSC family to look ahead. We have completed a second year of rebuilding and are poised, once again, to send men and women into space and return them safely to Earth. We will reestablish the Space Shuttle as a safe, reusable, versatile part of America's Space Transportation System. We will design and begin to manufacture a Space Station to help us improve the quality of life on our planet and give us a foothold in our ascent to others. We will imagine and create new technologies that allow humans to live and learn and work in space and on other worlds. We have much work to do, and it will require continued commitment to quality and dedication to excellence. But with curiosity and knowledge, practice and skill, determination and confidence, together we will attain the high goals we have set for ourselves. From my family to your families, I extend heartfelt hopes for a joyous holiday season.

Sincerely,

Aaron Cohen



'Twas the Night Before Christmas (Revisited)

[Editor's note: The holiday season inspires the Roundup staff with hope for the future of humans in space. We present the following with apologies to Clement C. Moore.]

'Twas the night before Christmas, when all through the Space Station
Not a crew member was stirring at that inclination
The stockings were Velcroed by the microwave with care.
In hopes that St. Nicholas soon would be there.
The astronauts were nestled all snug in their sleep restraints,
While visions of Tex-Mex ran contrary to diet constraints.
And the Commander in her IVA, and I in my cap,
Had just settled our brains for a 6-hours nap.
When out on the hull there arose such a clatter,
I sprang from my crew compartment to see what was the matter.
Away to the porthole I flew like a flash,
Switched open the shutters in the blink of a lash.

White-painted graphite/epoxy like new-fallen snow,
Gave the luster of midday to the trusswork below.

When, what to my wondering eyes should appear,
But a miniature sleigh, and eight tiny reindeer.

With a little old driver, so lively and quick,
I knew in a moment it must be St. Nick.

More rapid than Space Shuttles his coursers they came,
His radio crackled as he shouted and called them by name:

"Now Dasher! Now, Dancer! Now, Prancer and Vixen!
On, Comet! On Cupid! On, Donner and Blitzen!

To the top of the lab module! to the resource node!"

he'd call
"Now close the hatch! dog the latch! keep pressure loss small!"

As flight controllers monitored his craft on the fly,
When he met with an obstacle, they helped him get by.

So up to the airlock the coursers they flew,
With the sleigh full of toys, and St. Nicholas too.

And then, in a twinkling, I heard on the bumper
The prancing and pawing of each hoof a thumper.

As I drew on my slippersocks, and was turning around,
In the airlock St. Nicholas floated upside down.

The globe of an EMU helmet he held under his arm,
And the red of his space suit added holiday charm:

He had a broad face and a little round belly,
That shook when he laughed, like a bowlful of jelly.

He was chubby and plump, a right jolly old elf,
And I laughed when I saw him, in spite of myself:

A wink of his eye and a twist of his head
Soon gave me to know I had nothing to dread.

He spoke not a word, but went straight to his work,
And filled all the stockings, then turned with a jerk.

And laying his finger aside of his nose,
And giving a nod, through the airlock he rose:

He sprang to his sleigh, to his team gave a sign,
And away they all flew into the Earthshine.

But I heard him o'er the S band, as he drove out
of sight,

"Happy Christmas to all and to all a good night!"

People

Boeing selects general manager

Byron G. McKenzie recently was appointed general manager of Houston operations of Boeing Aerospace Operations. McKenzie comes to the JSC area from BAO's Cocoa Beach, Fla., office. His most recent position was project manager for BAO's engineering support to KSC's safety, reliability and quality assurance activities. McKenzie replaces Larry Elton who has been selected as deputy manager of Boeing Aerospace Co.'s remote locations and will be based in Seattle.



McKenzie

Former astronaut Eisele dies

Former Apollo astronaut Donn F. Eisele died Dec. 1, apparently of a heart attack, while on a business trip in Tokyo. A memorial service was held Dec. 7 in Fort Lauderdale, Fla. Eisele, 57, orbited the Earth for 11 days aboard Apollo 7 in October 1968. He retired from the U.S. Air Force and NASA in 1972 and went on to be Peace Corps director in Thailand. Eisele resided in Fort Lauderdale with his wife, Susan, and two children, Kristin and Andrew. Eisele, a retired colonel, had four children by a previous marriage.



Eisele

First Space News Roundup editor dies

Space News Roundup's first editor, Ivan David Ertel, died Nov. 26 after an extended illness. Ertel worked for NASA Public Affairs and History Offices from 1961 to 1972. He was assistant historian for Mercury, Gemini, Apollo, and Skylab programs, and completed volumes 3 and 4 of the Apollo and Skylab chronologies under contract to NASA. Ertel is survived by his wife, Zell, and three daughters. A memorial has been established with the American Diabetes Association.



Ertel

Women's program pioneer dies

Virginia Hughes, JSC's first full-time Federal Women's Program manager, died Nov. 19. Hughes developed the JSC Federal Women's Program Work Plan now being used by NASA Headquarters and other NASA centers in structuring agencywide and individual programs. She also worked as a discrimination complaints officer. Hughes is survived by her husband, H. Mervin II of Nassau Bay; son, H. Mervin III; and daughter, Sherrie H. Waggoner of Deer Park, Texas.



Hughes

Bulletin Board

JSC-EAA hosts New Year's Eve Dance

Tickets are available for JSC-EAA's New Year's Eve Dance. The dance will include a social hour beginning at 7 p.m. and a cold-cut buffet at 8 p.m. The dance begins at 9 p.m. and breakfast will be served between 12:30 a.m. and 1 a.m. Tickets will be on sale through Dec. 23 in Bldg. 3 cafeteria. There is a limit of eight tickets per person. NASA employees, contractors, USAF and NASA retirees are invited.

Prairie View alumni host Holiday Extravaganza

NASA employees are invited to a Holiday Extravaganza at 9 p.m. Dec. 26 at the Holiday Inn in the Houston Ballroom. The JSC Prairie View A&M University Alumni Chapter is hosting the non-profit fundraiser to contribute to PVU. For more information, call Judeen Edison, 438-7708 or 438-8481.

Tour of Chinese space program proposed

LA prospective September 1988 tour of China by the AIAA Houston Section Technical Delegation has been announced. The tour was inspired by the Sister Section Agreement with the Shanghai Astronautical Society. A first hand look at the Chinese space program may be made available along with visits to principal tourist attractions. Total cost of the 14-day tour is expected to be about \$3,000. For more details call Tai Ling Lee, x31621 or Jim McLane, 488-0312.

Military Officers Wives Club to meet Jan. 19

The next meeting of the Bay Area Military Officers Wives Club will be at 11 a.m. Jan. 19th at the Gilruth Recreation Center. Since lunch is served reservations must be made. All wives of active duty and retired military are welcomed. For more information call Lucy Saum, 996-9340.

Foreign language classes offered at UHCL

Non-credit foreign language classes in French, German, and Russian will again be offered at the University of Houston-Clear Lake. Small group classes at all levels of proficiency will be held in the Bayou Building and at the Regent's Park Training Facility. Classes will meet weekly for 1.5 hours for seven weeks beginning Jan. 11. Cost is \$92 for new students, and \$89 for returning students. For a brochure and registration materials, call 488-9315.

Gilruth Center News

Call x30304 for more information

Weight safety—This is a required course for employees wishing to use the Rec Center weight room. Classes will be Jan. 13 and 28.

Aerobic dance—Four-week class will meet Tuesdays and Thursdays from 5:15 to 6:15 p.m. beginning Jan. 5. Cost is \$12.

Country and western dance—Dance class starts Jan. 25 and continues every Monday from 7 to 8:30 p.m. for six weeks. Cost is \$20 per couple.

Defensive driving—Course is offered Jan. 16 and Feb. 20 from 8 a.m. to 5 p.m. and costs \$20.

EAA badges—Dependents and spouses may apply for photo identification badges between 6:30 and 8:30 p.m. Dec. 29 and Jan. 5.

Ballroom dance—Professional instruction in beginner, intermediate and advanced ballroom dancing begins Jan. 7 and runs for eight weeks. Classes meet Thursdays. Cost is \$60 per couple.

Physical fitness—Twelve-week program will be Jan. 4 to March 25 from 11:00 a.m. to noon or 4 to 5 p.m. All employees and dependents are eligible upon completion of physical exam and maximal treadmill stress test. Call x30302 for more information.

Second redesigned solid rocket motor firing is tomorrow

The second full-duration test firing of NASA's redesigned Space Shuttle solid rocket motor is scheduled for 2 p.m. CST Saturday, Dec. 19, at Morton Thiokol's Wasatch Facility near Brigham City, Utah.

Four full-duration tests are required in the solid rocket motor redesign program prior to STS-26's planned launch in June 1988.

The 126-foot long, 1.2-million pound motor, designated Development Motor 9 (DM-9), will undergo a full-duration horizontal test firing of two minutes. The test is designed to further evaluate the performance of major design features of the redesigned solid rocket motor, including the capture feature field joint, bonded field joint insulation, joint heaters and radially-bolted, case-to-nozzle joint design.

Test data during the firing will be obtained from more than 500 instruments on the motor. Instruments will measure such things as acceleration, pressure, deflection, thrust, strain, temperature and electrical properties.

The first full-duration test firing of a redesigned motor took place Aug. 30, and was a complete success.

A successful test firing of DM-9 will pave the way for the final two motor firings, Qualification Motors 6 and 7 (QM-6 and QM-7). Those firings are scheduled next spring.



JSC Photo by Benny Benavides

SANTA VISITS JSC—Mary Dunn meets Santa Claus at the Technical Services Division's annual Christmas Party in the Bldg. 9 high-bay area. Looking on are Joyce Davis, a TSD employee, and Ray Dunn, another TSD employee and Mary's father. Roger Nagel of TSD arranged for Santa to visit the Dec. 9 party.

Shuttle missions could stretch to 16 days

An extended-duration Space Shuttle Orbiter could make possible Earth-orbital missions as long as 16 days, according to a NASA report presented to Congress on Nov. 24.

Benefits of an extended-duration Orbiter could be significant for space science, technology, applications and commercial users both before and during the Space Station era, the report states, even though the necessary modifications would reduce the current payload weight capacity and require additional cargo bay space.

While the extended-duration Orbiter would not be required for Space Station assembly and operation, it could prove useful in devel-

oping experiments and crew procedures for the Space Station era. In addition, it appears there would not be a major impact on planned flight rates.

Issues addressed in the report include the technical aspects of developing the capability, the impact on Shuttle manifest flight rate, the flight requirements of Shuttle users and the possibility of a commercial venture in the development of an extended-duration Orbiter.

If the program were initiated, the cryogenic pallet kit and certain crew provisions required for a 16-day mission could be available in

about 45 months from the start date. The development cost for an extended-duration Orbiter is estimated at \$126 million.

The extended-duration kit would include the pallet, cryogenic tanks containing oxygen and hydrogen reactants, an improved Waste Management System (WMS), an improved Carbon Dioxide Removal System, vehicle modification, Ground Support Equipment (GSE) modification and system integration. The kit would reduce the Orbiter payload weight capability by about 8,100 pounds for ascent and 4,900 pounds for descent, and require seven feet of payload bay space.

Telerobotic servicer contractors picked

Grumman Space Systems of Bethpage, N.Y., and Martin Marietta Astronautics Group of Denver, have been chosen for negotiations leading to the award of parallel, firm-fixed-price contracts for definition and preliminary design studies of the Space Station Flight Telerobotic Servicer (FTS).

The FTS will be a space robot with automated features that will assist crews in the assembly, maintenance and servicing of the Space Station and visiting spacecraft.

Expected to be effective this month, the contracts will continue for nine months at a cost of \$1.5 million each. The studies will be performed at the contractors' facilities, said Andrew J. Stofan, NASA's associate administrator for Space Station.

Managed by Goddard, the FTS will allow robotic in-space assembly of Station elements and payload servicing. The FTS is slated to be launched on the first Space Station assembly flight.

Initially, the FTS will be capable of performing such diverse tasks as installing and removing truss members, installing fixtures on the truss, changing out Space Station orbital replacement units, mating thermal utility connectors and performing inspection tasks. The FTS also will enhance crew safety and productivity by reducing extravehicular time, using robots for hazardous tasks and freeing crew members from routine tasks.

As the system is evolved, it will perform telerobotic servicing and repair of spacecraft visiting the

Space Station. In the future, an FTS-equipped Orbital Maneuvering Vehicle could retrieve, as well as service, spacecraft beyond the Space Station's orbit.

In their studies, the contractors will analyze and evaluate various design concepts for the FTS, as well as the areas of robot configuration, the workstation, software and the FTS-to-Station interface requirements.

A key element of the Space Station program, the FTS will employ technology not used on previous NASA spacecraft. Robotics technologies developed in the FTS program are expected to have terrestrial applications and will play a role in enhancing the United States' industrial competitive posture worldwide.

Galileo's path to Jupiter complex

Probe will get gravity boosts from Earth, Venus

NASA's Project Galileo is being enhanced with inner-planet scientific observations and the first asteroid flybys while on its way to the planet Jupiter.

Primarily, Galileo will provide the first direct sampling of the atmosphere of Jupiter and the first extended observations of the planet, its moons and the intense magnetospheric environment.

Galileo is to be launched from the Space Shuttle in October 1989. A new trajectory will be used to send the spacecraft to the planet. Dubbed VEEGA, for Venus-Earth-

Earth Gravity Assist, the flight path will permit Galileo to fly close by two asteroids, Gaspra and Ida. Scientists will be able to perform the kind of analysis of asteroids planned for satellites of the Jupiter system as well as similar observations of Venus and the Earth-Moon system.

The mission was redesigned after the loss of *Challenger*. A solid-fuel Inertial Upper Stage (IUS) will be used rather than the higher powered liquid-fuel Centaur which would have provided a direct boost to Jupiter. The use of the lower powered IUS requires planetary

gravity assists to boost the Galileo spacecraft to Jupiter. The reduced launch energy will add years to the flight time to Jupiter.

On approach to Jupiter, a probe will be released from the spacecraft to sample the Jovian atmosphere. Following orbit insertion, a bevy of instruments will probe the mysteries of the planet and its inner moons which have puzzled scientists since the flybys of Voyagers 1 and 2.

The Galileo project is managed by the Jet Propulsion Laboratory. JPL built the orbiter. Ames Research Center is responsible for the probe craft.

Eagle Awards go to productivity improvement achievers

Thirteen JSC employees were honored for significant productivity improvement achievements by JSC Director Aaron Cohen at a Dec. 17 Eagle Award ceremony in the Bldg. 2 auditorium.

Nine employees received Gold Eagles, the highest award for productivity improvement and cost reduction, and four employees received Bronze Eagle awards.

Gold Eagle recipients included:

- Carl Hohman, Witalij Karakulko and John B. Henderson, all of the

Engineering Directorate, recognized for their contributions in developing Reaction Control System (RCS) engine rain protection;

- Dean W. Allen, a retired employee of the Orbiter and GFE Projects Office, and William R. Hammock, Jr., of the Orbiter and GFE Projects Office, recognized for savings related to ground support equipment at Vandenberg Air Force Base.

- Hector M. Rodriguez, a retired employee of the Orbiter and GFE

Projects Office, recognized for improvements in checkout of the Orbiter's electrical harness;

- Ray C. Malone of the Space and Life Sciences Directorate, recognized for savings associated with storage cushions for the Space Shuttle, and

- Irvin J. Burtzloff and Frank Weaver of the Engineering Directorate, recognized for savings related to use of the Shuttle Avionics Integration Laboratory (SAIL) com-

pressed data tape.

Bronze Eagle recipients included:

- Irwin D. Smith of the White Sands Test Facility, recognized for savings associated with obtaining excess hypergolic propellants from Vandenberg;

- Anibal J. Da Silva of the Mission Support Directorate, recognized for improvements in optical display alignment and digital gamma compensation in the Shuttle Mission Simulator (SMS); and

John D. Richardson and Francis J. De Vos of the Engineering Directorate, recognized for savings resulting from the integration of flight products data packages.

Administration of the Productivity Improvement Award Program and the Eagle Awards recently was transferred to the JSC Awards Office. All submissions or inquiries about the program should be directed to AH6, JSC Awards Office, x38411.

More flight tests to come

Tractor rockets pass early tests

The first four flight tests of a proposed Space Shuttle tractor rocket crew extraction system were a success and flight tests will continue without modifications, according to Bill Chandler, Crew Egress/Escape System manager.

A crew escape system is one of 64 mandatory return-to-flight Orbiter modifications being worked. The two systems being considered—tractor rockets and a telescoping pole—do not constitute an "all-aspect" crew escape system, but could be used during subsonic, controlled gliding flight when the Orbiter does not have enough energy to reach a site for an emergency runway landing.

The test tractor rockets, with lifelike dummies attached, were fired out of a Convair-240 aircraft modified to simulate the Space Shuttle's hatch opening.

"The objective of those tests was to determine the trajectory of the dummy coming out of the hatch with respect to the orbiter wing," said Chandler, back at JSC from China Lake, Calif., after the Nov. 19 and Dec. 1, 4 and 8 tests. "Clearing this tail flying this vehicle represents clearing the wing on the orbiter. In other words, if he clears that tail he'll clear the wing."

The flight test program consists of 12 flights, he said. Two design verification tests are planned for January, and the remaining four certification tests are to be completed at China Lake in March or April.

Tests to date have used rockets provided by the Thai Air Force and standard 26-foot Navy parachutes,

and have been without the new flight crew equipment.

"We'll run the last four tests with production rockets and production crew equipment, and that will constitute certification of the tractor rockets to meet the required trajectories," Chandler said.

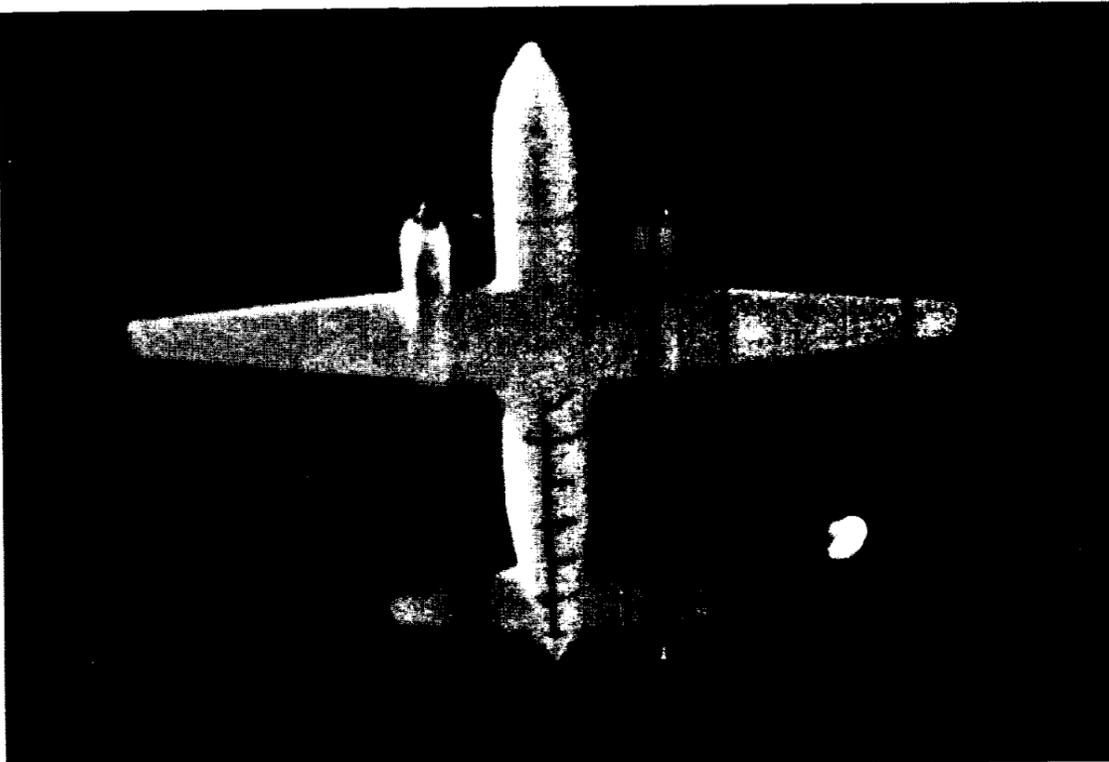
A telescoping pole extraction system also is being tested, but the pole's development didn't begin until June, eight months after the studies favoring tractor rockets were finished. The system would require astronauts to slide along a pole that extends out of the hatchway, and parachute to Earth.

"There's been concern all along about putting tractor rockets in the crew module because of pyrotechnics," Chandler said. "That concern is really the issue that has kept tractor rockets from being approved."

"It's obvious that if the pole would work well it would be a better choice for the program than tractor rockets because it's a benign device. There are no pyrotechnics in it and there's very little risk with it as long as it is not being used. The question really boils down to the success of the flight tests."

Tests of the pole system are scheduled in January using a UC-8 Buffalo aircraft and an Air Force C-141. "Boilerplate poles" will be used.

Whichever method is used, the hatch will have to be jettisoned first and parallel tests are examining that problem. At least two full system-level tests of the hatch jettison system are planned before first flight, he said. Pyrotechnics will cut the hinges and a hatch collar, and



Official U.S. Navy Photo

A dummy is pulled out of a Convair-240 modified to simulate the Space Shuttle's hatch opening. This photo, taken from beneath the aircraft, shows the tractor rocket and dummy clearing the horizontal stabilizer that represented the leading edge of the Orbiter's wing in tests at China Lake, Calif.

pyrotechnic thrusters will kick out the assembly away from the vehicle almost instantaneously.

While the extraction methods being tested would be useful within a narrow envelope, he said, hatch modifications could help the crew in other situations.

"The hatch jettison capability can help the crew in an emergency landing. If we have a collapsed landing gear, for example, the Orbiter would be most likely on its belly. It's a quicker, easier egress route than going out of the top, which is the current emergency egress route," Chandler said.

Chandler said excellent work by the team that has been working on

the crew escape system evaluation has helped keep things on schedule. Astronaut Steve Nagel has served in the unofficial capacity of a deputy systems manager on crew equipment, training and procedures. Jim Barnett of the Man-Systems Division and his team has worked with crew equipment. Robert Rice and his NSTS Project Office team have been instrumental in the flight test program. Cmdr. Bill Shepard has handled all Kennedy Space Center activities for Level 2 here. And Rick Barton has performed aerodynamics work.

Chandler said everything is on schedule if tractor rockets are chosen, but that the pole's flight

tests should be completed before a decision can be made on which of the two systems to install for first flight.

The extraction system and hatch jettison are two of four significant changes that should improve crew safety, he said. Two additional slide wire baskets, a new easy-access bunker and a flame-protected access area have been added at the launch pad. And a partial-pressure suit that will protect crew members at up to 100,000 feet, pressurized oxygen, a parachute, a life raft, a locator beacon and survival gear have been added to the crew equipment.

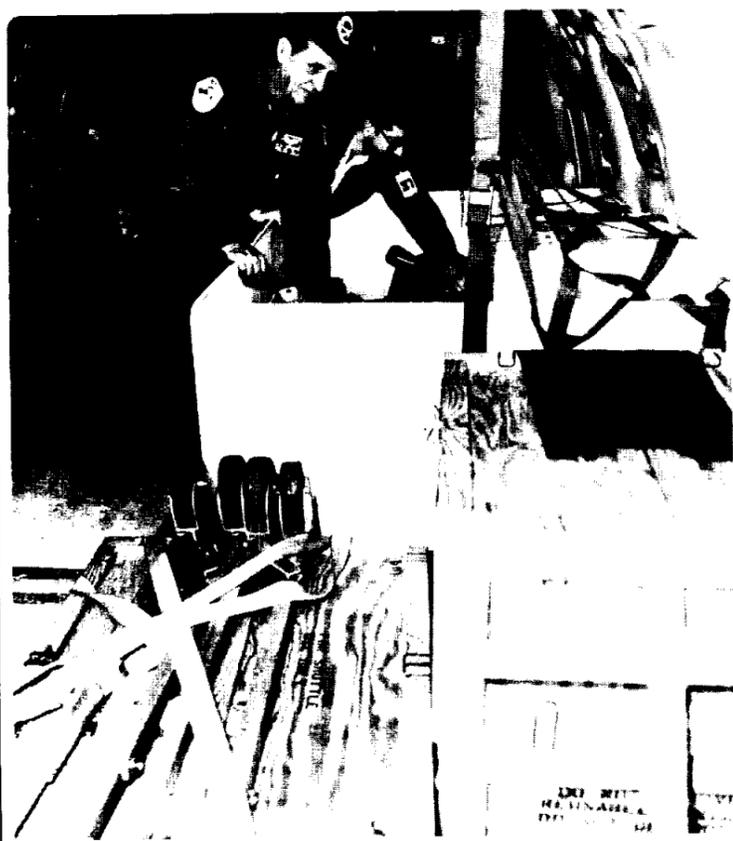
NASA, Canada reach agreement on Space Station

Negotiators from NASA and the Canadian Ministry of State for Science and Technology have reached agreement on a Space Station cooperation memorandum of understanding.

NASA Administrator James C. Fletcher and Canadian Science Minister Frank Oberle reviewed Dec. 10 the memorandum on cooperation in the detailed design, development, operation and utilization of the permanently manned, civil Space Station.

Negotiators on both sides next will submit the memorandum of understanding (MOU) text to their respective governments for consideration in accordance with their separate internal procedures.

Under terms of the new MOU, Canada will provide a mobile servicing system (MSS) to the international Space Station complex. The MSS, an essential part of the Space Station program, will be used in conjunction with the assembly, maintenance and servicing of Space Station elements. In exchange, Canada will participate in the management and operation of the Station, and Canadian users will be able to use the full range of capabilities provided on the permanently manned Space Station.



JSC Photo by Jack Jacob

KC-135 Crew Chief Richard Wellburn (foreground) and Flight Controller John Muratore check hardware prior to takeoff from Ellington Field. Flight controllers and equipment were destined for the White Sands Ground Terminal.

Bug-out

Real blizzard replaces fake hurricane in Mission Control emergency plan test

By Steve Nesbitt

A team of NASA flight controllers escaped an imaginary hurricane and flew instead into a real blizzard Dec. 14 as a plan to set up an emergency Mission Control Center at the White Sands Ground Terminal in New Mexico was tested.

The Monday simulation assumed that a severe hurricane was about to make landfall at Galveston Bay during a Space Shuttle mission. As a precaution against the real MCC becoming inoperable, the emergency team was dispatched to White Sands, the receiving station for data transmitted through the Tracking Data Relay Satellite (TDRS).

White Sands is the closest facility that could be used as a backup control center and receives its Space Shuttle flight data directly from the TDRS.

The 14 flight controllers and three support personnel took off at 7 a.m. from Ellington Field aboard NASA's KC-135 aircraft. Weather conditions worsened in New Mexico as a severe snowstorm caused Air Force personnel at Holloman AFB to close their runways, diverting the JSC

team to Kirtland AFB near Albuquerque.

The group, carrying three sophisticated data processing computers, was delayed more than three hours at Albuquerque until conditions improved enough to allow the NASA plane to fly into Holloman. Once there, flight controllers boarded U.S. Army helicopters for the trip west to White Sands.

After arrival at the terminal, the team set up and began to monitor Shuttle data and play into the simulation which had been running all through the day. The sim was carried through entry interface and demonstrated a remote flight control team's ability to function during on-orbit and entry flight phases.

Flight Director Granvil A. Pennington, who led the exercise, called the test a "total success."

The group returned to JSC Tuesday after having experienced temperatures below 10 degrees, Fahrenheit, and snow 18 inches deep at Holloman AFB.

Roundup Swap Shop

All Swap Shop ads must be submitted on a JSC Form 1452. The forms may be obtained from the Forms Office. Deadline for submitting ads is 5 p.m. the first Wednesday after the date of publication. Send ads to Roundup, AP3, or deliver them to the Newsroom, Bldg. 2 Annex, Room 147. No phone in ads will be taken.

Property & Rentals

Sale: League City, Pecan Forest, 3-2-2A, 11,600 sq. ft., corner lot, formal living, FPL, W/D, \$69,000, 7% VA. Schrader, 554-6342.

Lease: Webster, Piper's Meadow 3-2-2, large open living room, miniblinds, drapes, FPL, outdoor gas grill, fenced, ex. cond. Walter, 332-1609.

Lease: Galveston beach house, 3-2, FPL, \$100/day, Wright, 488-0667.

Lease: University Place townhouse, 3-2-5-1, refrig., microwave, fans, miniblinds, 1 mile to NASA, \$650/mo. David, x32791 or 488-9768.

Sale: CLC 3-2-2A, new vinyl flooring, stain-master carpet, FPL, fans, remodeled kitchen, microwave, custom cabinets, screened patio, gas grill, near Whitcomb Elementary, \$68,000. Johnston, x30020 or 488-5390.

Lease: Friendswood Imperial Estates, 3-2-2, den, custom kitchen, storage, patio, \$650/mo. Carney, 996-9404.

Lease: El Lago, 6-3-5-5, 3600 sq. ft., pool, sauna, game room, study, formals, near school, lake, JSC, \$1,000/mo. Jeff, x38630 or 480-4253.

Sale: Waterfront lot, secluded 1.5 acres, near NASA on Clear Creek. Jackson, 333-1665.

Sale: Mobile home off Wellborn Road, 2 mi. south of Texas A&M, convenient, safe, private, \$5,000. Terry White, x38649 or 332-5177.

Lease: Camino South, 3-2-2, FPL, new carpeting, fans, fenced, \$550/mo., \$300 deposit, available Jan. 15. Amann, x37916 or 333-2359.

Lease: 2 rooms plus bath, 3 miles from NASA, on lake, furnished, utilities, cooking equipment, separate entrance, off-street parking, pool, \$300/mo. Jeff, 532-1643.

Lease: Baywind II, 2-2-5, two story, new kitchen floor, paint, FPL, W/D, fans, pool, tennis, \$470/mo. Jeff, x30715 or 280-8608.

Sale: '77 Mobile home, set up at Texas A&M, 14 x 65, 2-2, central A/H, new carpet. \$8,000. Doug, x33367 or 480-2929.

Lease: El Dorado Trace, furnished condo, study 1 1/3 baths, W/D, color TV, appliances, linens, dishes, pool, tennis, jacuzzi, \$450 plus electric. Faye, 282-6422 or 488-7038.

Lease: Heritage Park, 3-2-2, fenced, patio, drapes, electric utilities, \$460/mo. Harris, 471-2490.

Sale/lease: Baywind I, 2-1-5-2, W/D, \$325/mo., electric, deposit. Thomas, 333-3992.

Sale: Seabrook subdivision, 3-2-2, fenced, new carpet, oven, vinyl siding, \$52,000. Susan, 280-8006.

Lease: Sagemont, 3-2-2, formal dining/living, cathedral den, fans, decked patio, garage door opener, \$550/mo., 1 mo. deposit, 1 yr. lease. Avila, 681-4126.

'80 Mobile home, 14' x 80', 3-2, balcony, kitchen, FPL, wet bar, appliances, screened patio, \$10,000. Busby, 559-2925.

Lease: Condo, next to NASA, 2-1-1, W/D connection, ice maker, fans, miniblinds, cable TV, storage room, no pets. Cecil, 488-0719.

Sale: 13.5 acres, gently rolling wooded east TX land, fronts county blacktop, near Tyler and Henderson, assumable low cost TX. Vet. loan. McLeish, 480-7445.

Cars & Trucks

'86 Toyota Tercel, 2 dr., 4 spd., 29K mi., new tires, AM/FM/tape, A/C, blue, \$5,600. Schrader, 554-6342.

'85 Mallard motor home, 35', loaded, low miles, ex. cond., \$38,000 or \$3,000 and assume note. Long, 337-4051.

'81 VW Rabbit LS, diesel, 4 dr., AC, AM/FM, \$1,200. Jim, x36213 or 488-7137.

'85 Dodge Caravan, 45K mi., ex. cond., \$9,800. Dianne, x30210 or 333-9242.

'80 Pontiac Bonneville, V6, 4 dr., \$1,900 OBO. Rick, x36156 or 480-1218.

'81 Dodge Colt, 38,000 mi., new tires, ex. cond., \$1,900. Zupp, 482-7156.

'71 Pontiac Grand Prix, 91K mi., \$1,500. Zupp, 482-7156.

'78 Grand Prix, loaded, ex. cond. Penrod, x30596.

'84 Suburban Silverado, all power, tilt, cruise, AM/FM/tape, \$10,000. John, x37142.

'80 Olds Toronado, V-8, all power, moonroof, 67K mi., light metallic brown, \$3,650. Jerry, x38922 or 333-9003.

'85 Subaru GL-10, power sunroof, digital displays, all power, electric options, AM/FM/tape, \$7,300. John, 488-0515.

'78 Datsun 280Z, blue, 4 dr., A/C, AM/FM, body ex. cond. Edwin, 363-9061.

'81 Chevette, good body, needs engine work, BO. Leonard, 482-9532.

'79 Dodge Custom Van, 318 engine,

needs engine work, BO. Leonard, 482-9532.

'79 Toyota Supra, good cond., 75K mi. Levine, x38832 or 488-6796.

'82 Mercury Capri, 6 cyl., auto, PS, PB, A/C, AM/FM/tape, cloth interior, 44K mi., ex. cond., \$3,525. Bob, x39079 or 488-5881.

'82 Subaru GLF, 2-dr. hardtop, A/C, AM/FM/tape, 5 spd., 35 mpg, ex. cond., \$3,200. Bob, x39079 or 488-5881.

'79 Rockwood Pop-up Camper, sleeps 6, stove, ice box, sink, water tank, good cond., \$2,100 OBO. Margaret, x33664 or 487-1204.

'84 Chevy Celebrity station wagon, loaded, \$4,900. Richard, x37139.

'86 Cadillac Fleetwood D'Elegance, loaded, ex. cond., 15K mi., ex. cond. Patricia, 335-6483 or 488-3292.

'80 Mitsubishi, Plymouth Champ, 2 dr., A/C, AM/FM/tape, 8 spd., \$1095. Roy, x38233 or 409 737-1824.

'82 Honda Accord, 4 dr., low miles, ex. cond., \$4,200. Carlos, x38879 or 554-7727.

'85 Honda Prelude, mint cond., \$11,000 or \$2,000 and take over payments \$224/mo. Leon, x38514 or 337-5381.

Boats & Planes

'87 SeaRay, 17' Seville, 140hp ski-boat, 6 hrs. on engine, ex. cond., \$9,500. Marcella, x33156 or 554-4812.

'85 Prindle Catamaran, 18', white, stainless steel trailer, rainbow sails, ex. cond., \$3,100 OBO. David, x31397 or 338-2763.

Mistral Maui sailboard, 6.0 bi-radial and 4.3m sail, good cond. \$695. White, 482-6291.

Cycles

'85 Suzuki GS 700E, 2,500 mi., ex. cond., \$1,995. John, x36484 or 486-1186.

'83 Suzuki GS 550E, orig. owner, 5,637 mi., ex. cond., \$1,250 OBO. Jana, x51653 or 480-5527, or Craig, 450-2336.

'82 Honda V 45 Sabre, custom modified tourer, \$1,700. Sauter, 480-0880.

'20" GT-PRO performer bicycle, custom wheels, cartridge bearings, extras, \$275 OBO. Jim, x38323 or 941-4733.

'80 Honda 750, low miles, mags, \$1,350. Chuck, x30092 or 481-3637.

Audiovisual & Computers

Apple IIe, extended 80 column, 2 floppies, Micro Modem IIe, joystick, grappler, Gemini 10x printer, mono monitor, software, \$800. Currie, x38313.

Commodore 64, color monitor, printer, disk drive, VIC modem, Pascal compiler, word processing software, desk w/hutch, ex. cond., \$500. Judy, 486-6820.

Visual 1050 computer, Z80, 2 drives, monochrome monitor, software: Wordstar, multiplay DR graph, BASIC, \$150. Jim Arnold, x34608.

Ashton Tate's D-base for Macintosh, new, \$400. Susan, 280-8006.

Amiga A1080 RGB monitor, new, \$245; A501 RAM expansion, 512K, new, \$140. Joe, x31931 or 996-1667.

Commodore 128 software, \$15 ea., Superbase, Partner 128, Data Manager 128; joystick for Commodore 64/128, \$12; plastic covers, disk drive, keyboard, \$5. 681-4126.

Zenith 19" color TV, table model, ex. cond., \$95. Joe, x31931 or 996-1667.

Emerson 19" color TV, new, warranty, \$190. Jepson, x31414.

Household

Den sofa, lounge chair, \$125; W/D, \$400; boy's BR, \$75; swivel chair, \$75; lamps, tables, pictures. Earle, x30571 or 480-7925.

4-seater round, solid wood table, brass base, vinyl-covered seats w/brass base, good cond., \$250; queen-sized bed, box springs, frame, new. Debbie, x30169 or 554-7442.

Sturdy Oakwood bunkbeds, mattresses included, ex. cond., \$325. Billie, x38334 or 482-4365.

Desk/vanity dresser for child, white French provincial, good cond, \$50. 488-6521.

Bunk beds, solid oak, heavy duty, ex. cond., mattresses, \$75. Alexander, x39385 or 487-1088.

Rattan dining set, 1 yr. old, round glass top, 4 swivel cushioned chairs, was \$900, now \$500. Benjamin, 334-1347.

Queen-sized sofa bed, ex. cond., camel plush fabric, was \$500, now \$200. Dorothy, x32221.

Whirlpool electric range, used 3 weeks, self-cleaning oven, \$250. Michael, 282-2717 or 532-1946.

Waterbed, super single w/bookcase, headboard, mattress cover, heater, \$85 OBO. Linda, 280-2116 or 479-4463.

Waterbed, queen-sized, new, black lacquer, bookcase, motionless mattress, 2 sets of sheets cotton and satin, \$550. Kim, 280-1815 or 409 938-3523.

Country style sofa, loveseat; small computer desk, ex. cond. Curie, 332-7205.

Dusty blue couch, loveseat, gray and beige pillows, \$400; glass and chrome dining table, 4 blue chairs, \$100, good cond. Judy, 486-6820.

Sunmarc Dimensions stoneware, ecru color, service for 8, \$40. Jana, x51653 or 480-5527.

Sears Coldspot, dorm-sized refrigerator, \$30. Maxey, 488-5015.

Bunk beds, oak, ex. cond., mattresses, bunkie boards, was \$650, now \$400. Kim, x34824 or 554-2030.

Stacked W/D, almond, 4 yrs. old, ex. cond., \$250; girls headboard/footboard, \$15; twin headboard, \$5. Marie, x38875 or 480-4507.

Full-sized bed, firm mattress, box spring, frame, \$100. Scott, x38858 or 532-1041.

New 23K/24K gold plated flatware 70-piece service for twelve, chrome nickel steel, padded storage case, was \$1,200, now \$350. Cliff, x38166 or 486-8810.

Bunk beds, mattresses, slats, good cond., \$175. William, 326-2187.

Kenmore Refrigerator 19 cu. ft., almond, 7 mos. old, \$400. Margaret, x37909 or 930-1509.

Contemporary oak finish tables, smoked glass inlays, coffee table, \$135; end table, \$112, ex. cond. Pierre, x32773 or 532-3515.

2 Early American sofas, 1-large, walnut trim, \$150; 1-medium, pine trim, \$50. Theodore, x34116 or 482-8827. Panasonic Microwave, 4.5 yrs. old, auto sensor cook, built-in turntable, ex. cond. was \$500, is \$150. Blackburn, 480-8280.

Double-sized waterbed, headboard, drawers for storage, \$150. Judy, x37906 or 326-5805.

Wanted

Want non-working refrigerators, window A/C, gas dryers, free removal. Issac, x31825 or 409 762-1799.

Want double bed, good cond. Judy, x37906 or 326-5805.

Want roommate to share 3-2, Friendswood, W/D, cable, microwave, household privileges, non-smokers, \$245/mo. all bills paid. Michael, x38169 or 482-8496.

Want photographic studio equipment, lights, stands, umbrellas, backgrounds, tripods, cameras, props. Michael, x38169 or 482-8496.

Want to buy electric trains. Don, x37832 or 996-1425.

Want front seats for Chevy van. Bob, x33593.

Musical Instruments

King Cleveland alto saxophone, good cond., new case, swab, neck strap, reed guard, mouthpiece, lyre, \$450. Laura, x34249 or 488-9721.

Wurlitzer Spinnet piano, brown mahogany, \$500. Bob, 482-9168.

Spencer flute, closed hole, C concert, ex. cond. \$200. Pope, 488-6521.

Clarinet, \$25. Dennis, x39012.

Photographic

Nikon F3, f4, Nikkor 35-70, Nikon SB-17 flash, MD-4 motordrive, ex. cond, \$1,000 OBO. Tran, 282-3298 or 280-0219.

Pets & Livestock

Chow puppies, male, \$150, 2 females, \$175 ea. Lester, 481-6368.

Free cats, 2 tabbies, 4 yrs. old, neutered males, all shots. Blackburn, 480-8280.

Lost & Found

Lost: Adult female German shepherd, black/tan, long haired, last seen 12/8/87 in Camino South, reward. Sally, x37485 or 488-5501.

Found: Tie tack with Greek fraternity insignia in Bldg. 45 parking lot, describe to claim. Thelma, x33373.

Miscellaneous

Baby items, 2 Fisher-Price nursery monitors, ex. cond., \$20 ea.; infant car seat, ex. cond., \$15. Carla, x30181.

Refrigerator, frostless Admiral dual temp. 17, \$75 OBO; solid hardwood night stands, \$10 ea.; bicycle 10 spd., \$25; boxes clay targets BO; CB antenna, \$5; misc. garage sale items. Dennis, x39012.

Variety of martial arts weaponry, ex. cond., sell by piece or sets. Leon, x38514 or 337-5381.

Hand crocheted items, reasonable prices, great for gifts. Rita, x36161.

Firewood, will deliver. Lester, 481-6368.

Garrett AM2 metal detector, \$115; '76 & '77 U.S. proof coin sets, \$14; 18 '76 Ike dollars, \$26. Theodore, 34116 or 482-8827.

FM wireless intercom, operates from any AC outlet, plug in talk 2-station, 2 sets, \$15 ea., good cond. Laura, x34249 or 488-9721.

Sound Design Model 5642, stereo w/phonos, metal tape/cassette player/recorder, stand, \$85 OBO. Terry, x33491 or 480-7340.

Airline tickets (2) to Las Vegas, 12/23-12/28, \$350 OBO. David, x31397 or 338-2763.

Programmable, portable, scanner, Realistic 10 channel incl. police fire, \$135, ex. cond. Sayers, 333-2395.

6" bench grinder, \$20. John, x36484 or 486-1186.

Sears Delux model rowing machine, ex. cond., \$370 OBO. Max, x38127 or 482-7879.

Powermatic heavy duty stationary sander, combination 12" disk, 6" x 48" belt, was \$1,500, now \$600. Bret, 488-1441.

S&W Model 686 .357 mag revolver w/6m. bar, 1 yr. old, cleaning kit, leather

case, 2 grips, \$225. Paul, x34309 or 280-9838.

'87 US Proof sets, penny through half dollar, \$15. Chuck, x31701.

Air conditioner for '74 Pontiac Grand AM, \$20; '74 Pontiac transmission, \$50; 4 rims, 2 tires, good cond., \$60; 2 Dune Buggy tires, 15 x 8 w/gold and silver rims, \$30, good cond. Richard, x30364.

Apartment sale, moving, furniture, books, wall hangings, miscellaneous. Debbie, x35049 or 554-4757.

Car top ski rack, fits all cars w/gutters. \$20. Schultz, 532-2082.

Panasonic telephone, answering machine, \$65, apartment size dinette w/4 chairs, \$50; 600 watt microwave, \$75; 13" color TV, \$75; ironing board, iron, \$15; can opener, \$10. Tammy, x38322 or 280-9720.

Gorham sterling silver sugar shell spoon in Chantilly, new, \$65. Johnson, 488-2000.

DP Gympac-2000 Fitness System wall mount, complete w/110 lb. weights, bench, all attachments for bench press, leg curls, ex. cond., \$175. Linda, x33844 or 409 925-4862.

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Cookin' in the Cafeteria

Week of December 21 — 25, 1987

Monday — Chicken & Rice Soup; Wieners & Sauerkraut, BBQ Ham Steak, Steak Parmesan, Beef & Macaroni (Special); Green Beans, Carrots, Au Gratin Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday — Tomato Soup; Potato Baked Chicken, BBQ Spare Ribs, Mexican Dinner (Special); Squash, Broccoli, Ranch Beans, Spanish Rice.

Wednesday — Seafood Gumbo; Liver & Onions, Baked Turbot, BBQ Ham Steak, Baked Meatloaf w/Creole Sauce (Special); Beets, Brussels Sprouts, Green Beans, Whipped Potatoes.

Thursday — Beef & Barley Soup; Chicken & Dumplings, Corned Beef w/Cabbage, Smothered Steak w/Cornbread Dressing (Special); Spinach, Cabbage, Cauliflower au Gratin, Parsley Potatoes.

Friday — Holiday — Christmas.

Week of December 28 — January 1, 1988

Monday — Cream of Celery Soup; Braised Beef Ribs, Chicken a la King, Enchiladas w/Chili, Italian Cutlet (Special); Navy Beans, Brussels Sprouts, Whipped Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday — Beef & Barley Soup; Turkey & Dressing, Country Style Steak, Stuffed Cabbage (Special); Corn Cobbette, Okra & Tomatoes, French Beans.

Wednesday — Seafood Gumbo; Catfish w/Hush Puppies, Roast Pork w/Dressing, Pepper Steak (Special); Broccoli, Macaroni & Cheese, Stewed Tomatoes.

Thursday — Cream of Tomato Soup; Beef Tacos, BBQ Ham Slice, Hungarian Goulash, Chicken Fried Steak (Special); Spinach, Pinto Beans, Beets.

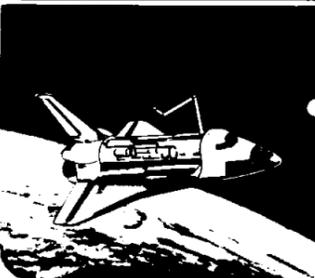
Friday — Holiday — New Year's Day.

SANDWICHES

On Wednesday we feature The Reuben: Corned Brisket, Swiss Cheese on a bed of Sauerkraut, Poupon Mustard on Rye and 1/4 Pickle. Monday and Thursday check out our French Dip Sandwich.

NASA
Lyndon B. Johnson Space Center

Space News Roundup



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

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