A memorial to space food pioneer Rita Rapp now hangs in the Bldg. 17 food laboratory. Story on Page 4.

National Aeronautics and

Space Administration

Lyndon B. Johnson Space Center Houston, Texas



'Scope scoping

Telescope gazing was one of the premiere activities onboard Discovery during STS-31. Photos on Page 3.

pace News Roundup May 11, 1990

∦Astro-1 to give cosmic **CAT** scan

By Kelly Humphries

In medical terms, Astro-1 with its three ultraviolet telescopes and one X-ray telescope will give the universe a cosmic CAT scan and provide unparalleled information about highenergy celestial objects.

Dr. Edward Weiler, Astro-1 program scientist and chief of astrometry at NASA Headquarters, said the telescope array to be launched aboard Columbia in two to three weeks will extend scientists' vision beyond the visible light spectrum and allow them to see some of the most energetic events in the universe. Earth's atmosphere absorbs most of the ultraviolet and X-rays before they can reach the ground.

The first Spacelab mission since 1985 will look at other galaxies, neutron stars, pulsars, black holes, quasars, binary star systems, star clusters, the interstellar medium and the recently discovered Supernova 1987a and more.

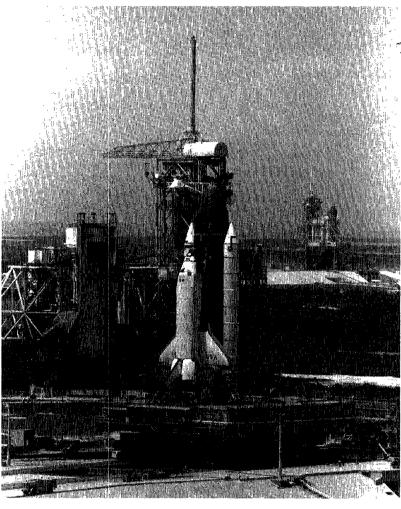
"If you were a doctor and a very sick patient came into your office and all you had was a stethoscope and a thermometer, the doctor would have a hard time diagnosing that complex human being," Weiler said.

'The same is true with astronomy,' he explained. "We need to study objects that are hundreds, thousands, even billions of light years away and all we have is light. Objects tend to give off light in all wavelengths. We need to study things across the color spectrum, just as a doctor has to study a human being

with many instruments.' Astro-1 will use a Spacelab pallet with an Instrument Pointing System (IPS) and a cruciform structure to bear three ultraviolet instruments mounted in parallel configuration. Also in the payload bay is the Broad Band X-Ray Telescope which has two co-aligned imaging telescopes.

The three instruments are the Hopkins Ultraviolet Telescope (HUT), the Wisconsin Ultraviolet Photopolarimeter Experiment (WUPPE) and the Ultraviolet Imaging Telescope (UIT). A star tracker, which supports the instrument pointing system, also is mounted on the cruciform.

"It's by viewing the sky from multiple wavelengths that we find pull out of the background," said Dr. the solar wind.



The Space Shuttle Columbia, foreground, joins Discovery at Kennedy Space Center's Launch Complex 39 prior to the STS-31 launch. It was only the second time in history that two shuttles occupied launch pads at the same time.

Ted Gull, Astro mission specialist at Goddard Space Flight Center. "And quite often, when we look at old favorite objects that we think we understand so much, we gain a lot of new insight."

Weiler and Gull are leading the team of scientists behind Astro-1. Dr. Art Code, University of Wisconsin, is principal investigator for WUPPE. Dr. Art Davidson, Johns Hopkins University, is principal investigator for HUT. Dr. Peter Serlemitosos, Goddard, is BBXRT principal investigator, and Ted Stecher, also of Goddard, is UIT principal investigator.

HUT will study faint astronomical objects such as quasars, active galactic nuclei and supernova remnants. It consists of a mirror that focuses on an aperture of a prime focus spectrograph. Observations of the outer planets of the solar system will be made to investigate aurorae clusters of galaxies, supernova and gain insight into the interaction remnants and stars. BBXRT will many new exciting objects which we of each planet's magnetosphere with directly measure the amount of

WUPPE will measure the polarization of ultraviolet light from celestial objects such as hot stars, galactic nuclei and quasars. It uses twomirror telescope optics in conjunction with a spectropolarimeter. This instrument will measure the polarization by splitting a beam of light into two mutually perpendicular planes, passing the beams through a spectrometer and focusing them on two

separate array detectors. UIT consists of a telescope and two image intensifiers with 70mm film. It will acquire images of faint objects in broad ultraviolet bands in the wavelength range and serve as a spotter for more detailed telescope investigations. This experiment also will investigate the present stellar content and history of star formation in galaxies.

BBXRT will study active galaxies,

*Coolant valve problem delays Columbia liftoff

By Kyle Herring

Replacement of a valve in one of Columbia's two Freon coolant loops will delay the launch of the STS-35 mission two to three weeks, shuttle managers said Thursday.

Two to three weeks

Both of the coolant loops, located beneath the forward portion of the payload bay, are required so that a backup is available should one fail.

The system provides cooling for orbiter and payavionics electronics equipment. At the close of

the two-day flight readiness review Wednesday, shuttle program managers elected to remove the flow proportioning valve at the launch pad and inspect it for contamination that may be restricting the flow through Freon coolant loop 1.

"We are obviously disappointed that we are not ready to fly," said William B. Lenoir, associate administrator for space flight. "However, this particular system is absolutely critical to the safety of the crew and overall mission success, so we have decided to change the component."

Launch had been scheduled for May 16 before the coolant loop problem was detected. The primary payload for STS-35 is the Astro-1 array of ultraviolet telescopes and the Broad Band X-Ray Telescope.

Vance Brand will command the 36th space shuttle mission and Guy Gardner will be pilot. Mission specialists are Mike Lounge, Jeff Hoffman and Robert Parker. Payload specialists are Sam Durrance and Ron Parise.

After weighing the relative risks associated with performing the work at the launch pad or in the Orbiter Processing Facility, the managers decided replacement and checkout on the pad is just as safe and effective.

A detailed timeline for the work is being developed and managers expect to have a better idea of how

long the job will take by early next week. A more definitive schedule will not be available until the major work items

have been identified, since Freon loop work involves activities that frequently do not proceed according to its schedule.

Another flight readiness review will be held before launch. The impact of the delay on remaining shuttle flights is still under evaluation. Once a target date for STS-35 is established, NASA-managers will assess the effect on the overall manifest.

Other work at the launch pad in the last week included the flight readiness test of Columbia's main engines. This hydraulic test simulates the main engine start sequence, including movement of the valves within the three main engines.

The liquid hydrogen fill and drain flex line in the mobile launcher platform, which was disconnected for removal of small debris last week, was retested with no problems earlier this week. Last week, ordnance work was completed and the payload bay doors were opened for continued servicing of Astro-1 and the Broad Band X-Ray Telescope.

STS-31 crew to brief employees

employees on the recent mission to at 1:30 p.m. today in Teague highlights of the April 24-29 mission. Auditorium.

Commander Loren Shriver, Pilot Please see ASTRO-1, Page 4 Charlie Bolden and Mission Special-

The STS-31 crew will brief JSC ists Kathy Sullivan, Bruce McCandless and Steve Hawley will narrate a deploy the Hubble Space Telescope slide and video show depicting the

> All civil service and contractor employees are encouraged to attend as their workloads permit.

*Hubble nearly ready to snap first photo

By Pam Alloway

Ground controllers believe the Hubble Space Telescope may be ready to take its first photographs of deep space sometime next week despite concerns over a slight wobble and problems with the telescope's pointing system.

Controllers at the Space Telescope Operations Control Center (STOCC) at Goddard Space Flight Center on Tuesday began a 36-hour process of properly pointing the telescope and focusing its wide field camera. The process will entail a sequence of commands that will complete the first "bootstrap" phase of focusing the telescope. Operators will position the telescope, lock the fine guidance sensors onto guide and target stars, and complete general focusing.

Early this week, controllers commanded the telescope to look for stars

of a certain brightness in what scientists thought was a rich field, but the telescope didn't find any. Wednesday, controllers reported that an older coordinate system had been used in updates to the telescope's pointing system. The difference between the older system and the current system, coupled with the way the system was implemented, apparently caused Tuesday's pattern matching difficulties. Once the telescope locks onto bright stars, it will remember where it was pointing and be able to find other targets.

When a "first light" test image is attempted, scientists expect the observatory to train in on a star cluster that is about 1,200 light years away and 3 billion years old. The cluster is in the Milky Way and was formerly known as NGC 3532. It is an open Please see HUBBLE, Page 4



JSC Photo Scott Wickes

ON BUILDINGS OFF SITE—Vicki Cantrell of JSC's Documentation Management Branch places the NASA logo on the Nova Bldg. last Friday. The vinyl letters, which will be on the Nova, Vanguard, Atlas, Eagle and One Harbour Square buildings leased by NASA, will make it easier for visitors to find NASA offices and conference facilities off site, said Patsy Mitchell, JSC resident facilities manager for Off-site Space.

Pink, green, blue sheets go white

By Pam Alloway
Pink, green and blue are out and white is in. Paper that is.

In support of JSC's recycling effort, pink and green announcement sheets will be obsolete within the next few weeks. The Management Services Division, JSC's printing shop and others are in the process of replacing the pink JSC Announcement and green management directive paper with white sheets.

"We'll have two different banners to help people distinguish these in a sea of white paper in people's in baskets," said Bill Larsen, chief of the Management Services Division. "We're not talking about large numbers of papers in the overall scheme of things but we are talking about the center's leadership saying we want our management documents to reflect the ecological needs of this Earth."

Blue personnel announcements already have gone by the wayside

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays.

General Cinema (valid for one year): \$3.75 each.

AMC Theater (valid until May 1991):

Sea World (San Antonio, year long): adults, \$17.25, (2-day, \$21.95); children (3-11) \$14.75, (2-day, \$18.95).

Astroworld (valid 1990 season): season, \$39.95; regular, \$15.97; children, \$9.21; Waterworld, \$8.15; 2 day-AW/WW, \$18.47.

New Orleans Fling (June 23 & 24; \$25 deposit by May 15): \$125 each.

Galveston Home Tour (May 12,13): \$10 each.

Listen!

Need the latest information on what's happening at JSC?

The JSC Employee Information Service may have just what you're looking for.

Updated every day at 11:30 a.m. the recorded announcement can be reached by calling:

483-6765

JSC

Dates & Data

Today

STS-31 briefing—The crew of the STS-31 Hubble Space Telescope mission will brief employees on their experiences at 1:30 p.m. May 11 in Teague Auditorium. All employees are encouraged to attend as their workloads permit.

Inventor's luncheon—The fourth annual JSC Inventor's Luncheon will be held at noon May 11 in Rm. 216 of the Rec Center, JSC Director Aaron Cohen will present 47 plaques to 40 inventors this year. For more information, contact the JSC Office of Patent Counsel, x31012.

JSC Astronomical Society program-A program on the "Stars of Spring" will be held at 7:30 p.m. May 11 at the Lunar and Planetary Institute. For more information contact Bill Williams at 339-1367.

Cafeteria menu-Special: fried chicken. Entrees: fried shrimp, baked fish, beef stroganoff. Soup: seafood gumbo. Vegetables: okra and tomatoes, buttered broccoli, carrots in cream sauce.

Monday

Cafeteria menu—Special: meat sauce and spaghetti. Entrees: franks and sauerkraut, sweet and sour pork chop with fried rice, potato baked chicken. Soup: cream of potato. Vegetables: French beans, buttered squash, lima beans.

Tuesday

Information security—The University of Houston-Clear Lake will hold a conference May 15-16 to address the issue of protecting information and information systems. The cost is \$150 for government employees, \$250 for industry, \$60 for students, and includes lunches and materials. Contact Glen Van Zandt, x33069, for registration

Women's program—The Federal Women's Program will hold its annual observance with the theme "Workforce 2000: Women's Vital Role." The observance is from 9 a.m.-4:30 p.m. May 17-18. Luncheon tickets are \$7.25 and must be purchased by May 15. All sessions will be held at the Rec Center. For more information contact Katie Nguyen, x33185.

Cafeteria menu-Special: smothered steak with dressing. Entrees: beef stew, liver and onions, shrimp Creole. Soup: navy bean soup. Vegetables: buttered corn, rice, cabbage,

Wednesday

JSC Astronomy Seminar—An open discussion will be held from noonp.m. May 16 in Bldg. 31, Rm. 129. For more information call Al Jackson, x33709.

Cafeteria menu-Special: salmon Croquette. Entrees: roast beef, baked perch, chicken pan pie. Soup: seafood gumbo. Vegetables: mustard greens, Italian green beans, sliced beets.

Thursday

Lunch and learn-The American Institute of Aeronautics and Astronautics Ground Testing and Simulation Technical Committee will hold a lunch and learn meeting from 11:30 a.m.-12:15 p.m., May 17 in the Bldg. 3 cafeteria. Dr. Donald M. Curry will speak on "Aeroassist Flight Experiment (AFE)—An Overview." For more information contact Dr. S. Arepalli,

Cafeteria menu-Special: stuffed cabbage. Entrees: beef tacos, ham and lima beans. Soup: beef and barley. Vegetables: ranch beans, Brussels sprouts, cream style corn.

May 18

"Earth on Candid Camera" - The Houston Space Society will present

"The Earth on Candid Camera" at 7:30 p.m. May 18, in the Atlantic Room of the University of Houston. David Amsbury will be guest speaker. For more information call 639-4221.

Cafeteria menu-Special: Salisbury steak. Entrees: fried shrimp, deviled crabs, ham steak. Soup: seafood gumbo. Vegetables: buttered carrots, green beans, June peas.

BAPCO meeting—The Bay Area PC Organization (BAPCO) will meet at 7:30 p.m. May 22 at the League City Bank and Trust. For more information call Earl Rubenstein, x34807, or Tom Kelly, 996-5019.

May 23

JŠC Astronomy Seminar—A video tape about the Keck Observatory will be shown from noon-1 p.m. May 23 in Bldg. 31, Rm. 129. For more information call Al Jackson, x33709.

May 24

Technical symposium—The American Institute of Aeronautics and Astronautics (AIAA) will hold its 15th annual Technical Symposium from 8 a.m.-5 p.m. May 24 at the University of Houston-Clear Lake. For more information contact Michael R. Laible, 282-4573.

May 29

JŚC Astronomy Seminar—An open discussion meeting will be held from 12:30-1 p.m., May 29, in Bldg. 31, Rm. 129. For more information call Al Jackson, x33709.

June 3

International conference—The Space Summit will hold an International Conference on Manned Space Exploration June 3-6. For more information call 1-800-448-4035.

MPAD wake and reunion-The

Mission Planning and Analysis Division (MPAD) plans a wake and reunion (W&R) for the now-defunct branch. All former civil service MPAD-'ers are invited to the 4-8 p.m. June 15 event at the Rec Center Pavilion. Deadline for reservations is June 4. For more information, call Gloria Martinez at x38091.

June 20-22

Space Business Roundtable-The Houston Space Business Roundtable will hold its first International Symposium on Measurement and Control in Robotics June 20-22 at the Rec Center. For more information call x31724.

ISMCR meeting—The International Symposium and Control in Robotics (ISMCR) will meet at JSC, June 20-22. For more information please phone Dr. Zafar Taqvi at 333-

October 20

Wings Over Houston—The 1990 Wings Over Houston Airshow will be Oct. 20-21 at Ellington Field. The U.S. Navy's Blue Angel aerial demonstration team and the U.S. Marine's vertical take off and landing jet, the Harrier, will participate. The Confederate Air Force will also celebrate the 50th anniversary of the Battle of Britain with its WWII airpower demonstration. Contact Col. Ray Jones, 850-7545 or Lu Lewis, 784-5200 for more information.

October 30

Space Exploration '90—A major conference and aerospace industry exposition, sponsored by the NASA Alumni League, will be held Oct. 30-Nov. 1 at the South Shore Harbour Resort and Conference Center. Contact Carol Ramey, exposition manager, 1-800-765-7615, for information.

JSC

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

Property

Sale: Lampasas City, 1,011 acres, \$425/acre, all amenities. 946-7587.

Sale: LC mobile home, 14x80 on priv. lot, 50x150, \$23K. 334-1883.

Lease: 1 BR condo, FPL, W/D conn., fan,

appli., avail. May 1. Jim Briley, 488-7901. Sale: Santa Fe, 3.8 acres, 3 septic sys., 2 wtr. wells, pond, 14x72 mobile home. Kelly, 925-

Sale: CL/Camino So., brick 3-2-2, LR-DR. den-FPL, \$75K. 486-9791. Rent: Townhouse, 2-2.5-2, new paint/

carpeting, FPL, appli., patio, stor., \$800/mo., non-smoking tenants. 488-2664.

Sale: 2 res. lots, 70x185/ea., Friendswood, owner fin. w/10% down. 482-5226. Sale: Bay house on Caranchua Bay, near Palacios, furn., access to boat ramp, pier, \$40K.

(409) 543-2052. Rent: Lake Travis cabin, priv. dock, cen. AC/ H. fully equipped, accom, 8, spring/summer. \$325/\$425 wkly., \$75/\$85 dly. 326-5652.

Lease: So. Bend/San Jacinto College So. 3-2-2, form. dining, FPL, no pets, \$595/mo. 482-

Lease: Heritage Pk., 3-2-2, form. dining, bkfst. area, no pets, miniblinds, fan, FPL, \$695/mo. Rent: Bay Area Blvd. condo, avail. May 13, 2-2, new carpet/paint, no children/pets/

smokers, W/D conn., refrig., \$460/mo. Rodney, x38889 or 480-1340. Rent: Mobile home lot, \$85/mo., \$50 dep.,

Oklahoma and Kinne, Bacliff. 488-1758. Lease: LC, Newport, 3-2-2, avail, June 5. \$675/mo., no pets, ref. 488-6306.

Sale: Camino So., 3-2-2, hdwd. firs., new carnet, near RSOC, 9.5% FHA assum., \$79,900.

Brian, 483-7070 or 280-8500. Sale: By owner, Piper Meadow, 3-2-2, FPL,

form. DR, fen. yd., \$73,500. 332-5923. Lease: Webs./Ellington, 2-1 w/extras, new paint/carpet, \$395/mo. Dave, x38156 or 486-5181 or Fric v38420

Rent: 2 rooms in LC house, \$250/mo., furn. or \$225/mo. unnfurn., bills split evenly, nonsmokers, pets tolerated, Russ, 332-4336. Rent: Lake Livingston wtrfrnt. house, 3-2, CA/

H, furn., cov. decks, pier, ex. cond., wknd./wk. rates. 482-1582. Trade: 4-3, off 360 W. of Austin, prefer 5 yr.

old, open plan w/in 20 min. of JSC. 471-8795 or 333-6083. Sale: Lots, Newport, no flooding, country club membership incl., excl. Sect. IV, \$5,500 or \$10,000/both. Joe, 944-6513 or 353-7357.

Sale: Lot, Dixie Hollow Sub., Cyprus Hollow

St., Pearland, \$10K. 483-9530.

Sale: Lake Livingston, Waterwood, 2-1, 2story on 1/4 acre, dbl. CP, deck, CA/H, stor.

Cars & Trucks

'81 Olds Cutlass Cruiser wagon, ex. cond., new AC/trans./batt./wtr. pump, 2 new tires, \$1,795. David, 282-3827 or 554-5514.

78 Pontiac Firebird Esprit, 350 4V, good cond., \$2,250, Currie, x34703 or 484-3317. 79 Mercury Marquis w/reb. trans., runs good,

\$600, OBO. 480-8357 or 943-2205. '88 GMC Sierra SLE PU, 18K mi., 350 eng.,

auto., AM/FM cass., towing pkg., \$12,500. Roland, 920-7273 or 481-5606. '74 Chevy 1 ton van body furn. truck, rear

pwr. lift, new eng., runs great, \$3,300. 481-6991 '88 Hyundai GL, 4-dr. sedan, 5-spd., AM/FM/cass., warr., BO. Becky, x31420 or 488-0556.
'81 Delorean, 27K mi., all updates, \$15,500

nego. Randy, 282-6714 or 486-4940. '82 Porsche 924, ex. cond., 62K mi., 5-spd., well maint., \$6,500. 283-5471 or 280-8796.

'80 Olds Cutlass Brougham, 4-dr., all pwr., AM/FM tape, tilt, \$1,800. 337-3811.

'77 Olds 98, 2-dr., tilt, all pwr., \$1,350. 337-

'84 Chev. Silverado 1/2 ton PU, ex. cond., 78K mi., \$5,500. Kevin, 333-6285 or 480-6935. '85 T-bird Elan V8, full pwr., ex. cond. Richard, 538-1854.

76 Mercedes 300P, sunroof, air, PW, \$3,650. 554-6093.

'88 Chevy ext. cab dually, auto., PW/PL, 454, auto. Kelly, x36169 or (409) 925-1819. '65 Olds Starfire sport coupe, good cond., \$2,500, OBO. Tom, x38298 or 488-4089.

77 Porsche 924, sunroof, AM/FM/cass., 79K mi., \$4,000, OBO, 333-7345 or 474-2339.

77 Corvette, good cond., sell or trade for PU, \$4,950, Bruce, 485-0396. '84 Monte Carlo, 2-dr., CL series, loaded, well

maint., ex. cond., \$4,250. Bruce, 485-0396. '76 Cadillac Coupe de Ville, ex. cond., 66K mi., ex. cond., \$2,750. 488-6306.

'88 Suzuki Samurai, JX, convert., take over pmts., \$220/mo. 332-5923.

'85 Buick Park Ave., 4-dr., ex. cond., 66K mi., \$7,100. 482-1535. 86 Ford T-bird, 4 cyl. turbo, 2-dr. coupe, AM/

'72 Ford F-100 1/2 ton PU, w/camper, 3good cond., \$1,200. Randy, x36563 or '88 Chev. Scottsdale (SWB) truck, V8, loaded, ex. cond., \$9,800. Tim, x39289 or 475-1435.

Cycles

FM. ex. cond., \$6,900, 538-1711,

'86 Honda Shadow shaft-drive wtr-cooled 5-spd. OD, ex. cond., \$2,250, OBO. Chuck Biggs, 280-1500 x3193 or 930-8008. 88 Honda XR250, ex. cond., \$2,000. Kevin,

333-6285 or 480-6935. '82 Suzuki GS 550 MZ Katana, 11K mi., good cond. Kevin. 333-7076 or 480-2549.

'81 Suzuki 850cc motorcycle, low mi., ex. cond., snow suit, helmets, \$1,400. Patrick,

x32635 or 488-1079.

Boats & Planes '78 MacGregor 22' sailboat trlr., 7.5hp OB, sleeps 5, \$4,600, OBO. 332-7167.

Fishing boat, 14' fiberglas, 15hp Evin., trolling motor, trir., \$650. 482-9576. '78 Johnson 140 OB motor, 40 hrs. on reb.

owr. head/lower unit, ex. cond., \$2,150, OBO. Andy, 333-6671 or 332-9105. 26' Express Cruiser, ex. cond., AC, camper, AC/DC refrig., \$14.9K, OBO. 280-8796.

Das Ugly Stik, R/C airplane, prof. built, new, all access. incl. Jeff, 474-4529. '87 18' Celebrity Calais Bowrider/ski boat,

165hp IO, Sportsman galv. trir., w/spare, ex. cond., BO over \$11K. 333-1640. 18' Sea-N-Ski walk thru tri-hull, 85hp

Johnson, galv. trlr., \$1,200. George, 280-1307 or 471-0150. 15' Coronado sailboat, ex. cond., trapeze, trlr., \$1,800. x37950 or 468-6811. 18' sailboat, fiberglass tri-hull, 6hp OB, trlr.,

\$795. Boyd, x38623 or 479-7171 '79 16' Renegade ski boat, 140hp Evin., SST prop, trlr., ex. cond., \$3,750 nego. 333-6868 or

16' ski/speed boat, 140hp Evin., SST prop, ex. cond., \$3,750, OBO. 333-6868 or 486-7846. Sunfish sailboat, trlr., good cond., \$900. 483-8278 or 326-2995.

Audiovsual and Computers

TI-994A computer w/exp. box, ext. mem., floppy disk, disk manager, ext. basic, TI writer, BO. Mark, x31997 or 334-1474. VHF marine radio, 12 ch.; chart depth rec.;

La Marche Constavolt, 15A, all ex. cond., \$60/ ea. Frank, x35798 or 479-6829. Sony 100 W rec., \$290; Sansui 12 disk changer, \$290; Infinity RS1000 spkrs., \$95; Cerwin Vega D-2 spkrs., \$95; 19" color TV w.

rem., \$250; 19" color TV, \$100; Sony Beta VCR w/25 movies, \$90. 483-6759 or 482-7814. Amiga A2000 computer w/2 floppy drives.

color monitor, ex. cond. Carroll, 484-5027. 2 pr. Kenwood spkrs., 12" poly woofer, 20-25k, H2, \$100/pr, Dan, x30676 or 528-6671.

C-64 W/MPS 802 printer, 1541 diskdr., 1802 color mon., 300 baud modem; software: Wishbringer, EasyScript 64, Leader Board, Kitchen Companion, very good cond., \$400. Sandy, 487-5767. PC-XT clone, new 10Mhz motherboard,

640K, 2 floppy drives, CGA, math co-proc., amber monitor, AT keybd., \$475. Steve, x38651.

Household

qual, 283-5496 or 332-1614.

French Prov. DR set w/leaves, 6 cush. chairs (2 w/arms), \$425, Samouce, x35053 or 482-0702. Sears washer, 5 yrs. old, good cond., \$140. 3 lg. table lamps, \$20/ea., curtains, 100x84

(white w/brn. specks), \$20. Bill, 554-4781. Sofa, loveseat, ex. cond., brns., \$250; butcher block kitchen table, ex. cond., \$200, x32933. Solid maple dresser w/bev. mirror, antique

Brn. earth tone couch, 6' long w/foot stool, \$150, OBO. Carri. x31985.

Antique oak armoire w/bev. mirror, \$380; coffee table w/2 end tables, \$35. 996-1442. Chest freezer, upright freezer (needs wk.), refrig., \$100/all. Lewis, 488-5019.

Triple dk. walnut dresser chest dbl. mirrors, contemp., \$75. 488-0667. Oval DR table, 1 leaf, 6 cane backed chairs

w/uphol. seats, 2-pc. hutch w/glass shelves, stor., good cond., \$400. Sandy, 487-5767. Kohler pedestal sink, new, was \$600, now \$225, almond. Harry, 483-0263.

Musical Instruments

Kimball K600 Stardust console elec. organ. 2 61 note manuals, 25 note pedalboard, \$3,000. Samouce, x35053 or 482-0702. King trombone w/case, metronome, \$275.

Jan, x30551 or 482-6120. Yamaha ME-10 stand-up keybd. w/instr., bench, spkr., ex. cond., \$1,000, 559-2325. Selmer-Bundy cornet w/valve oil, case, good

cond., \$100, OBO. Terry, 474-5639. Pets & Livestock

Yorkie, male, AKC reg. 488-8198. Free cat, 1 yr. old, white and gray/brn. long hair, spayed, shots. 474-4132.

AQHA mare, 5 yr. old, started on barrels, ex. bloodline, \$2,000, x33224 or (409) 986-6641. Free kittens, ready end of May. Carolyn, (409)

AKC Pekingese pups, 4 M, 1 F, blk. or sable, \$300/ea., OBO. Mae, x33082 or (409) 925-6632

Blue/gold Macaw, 7 mos. old, very tame, starting to talk. x35827 or 485-0900. Free kittens, 483-9530.

Wanted

Want depend, ride from Pasadena/Baspberry, hrs. flex. Pee Wee, x33778 or 946-7587. Want male roommate to share 3 BR house in LC, \$300/mo., bills pd. John, 334-3422 or

Want motocross chest protector, pants, and motocross bike, 125cc, '84 or newer, Andy, 333-6671 or 332-9105.

Want toy trains, Starwars toys. Ron, 482-1385 Want fem. roommate to find/share 2 BR apt. in Seabrook area. 532-2296.

Want non-smoking roommate to share 3 BR house in LC, avail. July. Mike, x31027 or 488-Want broken radios cass other elec-

gadgets. David, 486-5259. Want color monitor, any cond., for AT&T 6300 pers. computer, David, 486-5259. Want to rent/lease house w/acreage for

horses, 1-5 ac. pref., Pearland, Friendswood, LC. Dickinson, Santa Fe area, 332-8100. Want scuba equip., regulator, BC, wetsuit,

knife, etc. Russell, 481-3555. Want transit surveying instrument X-35187.

Want to rent 3 BR home near JSC. Kathleen,

480-1024 or 333-7075.

Want all kinds of toddler age toys, lg. items, will buy or trade for infant items or 2 lg. Cerwin Vega spkrs; trade 2 lg. Cerwin Vega spkrs. for 2 good qual. sm. cab. spkrs or home cass. player. 334-4361.

Miscellaneous

Bill. 554-4781.

Sofa, loveseat, chair, ottoman, beige w/rust flowers, ex. cond., \$1,500; 27" men's bike, \$25; Austrian crystal figurines, \$20/ea. Currie, x34703 or 484-3317.

Tour Model II irons, 1-9, PW&SW, ex, cond., \$150; metal woods, \$30/ea. David, 554-5514. Ground effects, sunroof deflector, rear wing sparler, 488-8198.

Century infant car seat, \$35; Century recl. baby swing, \$15. 482-9576. Home spa (new), \$20; Realistic amp, turn-table, cass. deck, 8 trk., 2 flr. spkrs, \$500/all.

Bell ans. mach., 4 mos. old, warr., \$40; wine colored sofa, \$80; 2 chrome/glass end tables, \$60/both. Angela, x34779 or 947-2317. High waist wetsuit, top XL, bottom, L, hood.

gloves, boots (sz. 10), \$150. Mike, 483-5178 High qual. wtr. filter, new, \$99, OBO. 283-

5496 or 332-1614. Sears manual treadmill w/timer, ex. cond, \$95, OBO, 554-6004. Dumbell wt. set, 5-25 lbs, plus bar, \$75, OBO;

wtrbd. matt., htr./liner, queen sz., \$50. Travis or Tracy, 480-1846. 10x12 dome tent, \$150; queen sz. air mats,

2/ea., \$25/ea.; bicycle rack, holds 2 racks: rowing exer. mach., \$50. 486-1092. Tunturi exer. bike, \$150, OBO; DP 300 rowing

mach., \$25, x35187 or 333-4396. 6' unfin. cedar bar, drwrs., stor., \$100. 486-0297.

BR set, \$180; round table, chairs, \$80; push mower, \$50; teak ster. cab.; framed posters; tools. 483-5528 or 482-7814. Leupolo Vari-X-II. 4x12 w/adi. obi., \$150:

RCBS Jr. reloading press, \$25. Don, x39237 or 331-4059. 4 white adj. bkshel., \$30/ea.; steelcase gray metal desk, \$90; 4-drwr. file cab., \$75/ea. 333-

7000 or 480-1086 Sharp ster., Mod. SR 156-OR w/4 spkrs. 333-

Wooden stand for 27" TV, VCR compartment w/dbl. doors, \$60, 326-2783.

drwr., \$60. x38278 or 326-2995. Wtr. filter, warr., new, \$80. 480-1024 or 333-

2 file cab., metal, good cond., 4 drwr and 5

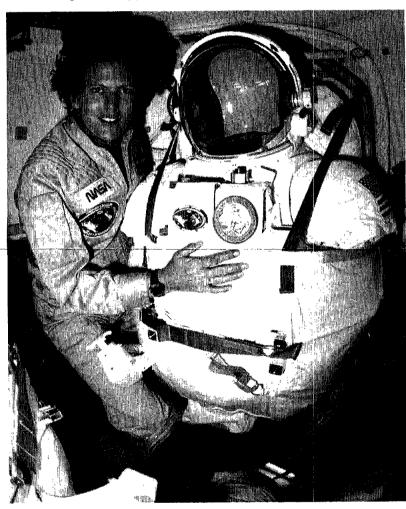
8' solid wood bar, uphol. arm rests, \$120. Larry, x33168 or 488-7460. Swimming pool, new, 15x30 Lomart above ground, \$2,100. Tom Clark. 483-9842.

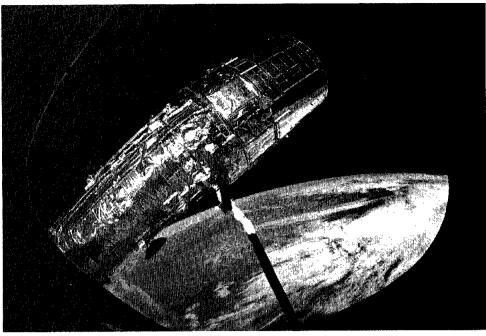
High perf. Edelbrock alum. Intake manifold for Ford 289-302 cid. V8, ex. cond., new, 4 mos. old, \$100, OBO. Terry, 474-5639.

Sears 3-spd. touring bike, ex. cond., \$75; Rockwell 10" table saw, \$250. Bill, 483-4315 or 485-6276.

Gazing at a stargazer

Along with star gazing, telescope gazing was one of the main activities on board Discovery during the recently completed STS-31 mission. Clockwise from top right: 1) The Hubble Space Telescope (HST) is suspended from the orbiter's remote manipulator system arm as Mission Specialist Steve Hawley works the controls. 2) Mission Specialist Bruce McCandless, Hawley and Commander Loren Shriver engage in some 'scope scoping through the overhead windows. 3) Mission Specialist Kathy Sullivan, left, and Shriver are captured by a fish-eye lens on the flight deck. Sullivan is working with a Hasselblad camera and Shriver, pen in hand, is amending flight data on the aft flight deck. 4) Sullivan stands by the airlock, almost fully suited in her extravehicular mobility unit (EMU) space suit. She and McCandless later came within minutes of stepping outside Discovery to assist with HST deployment. 5) Sullivan and McCandless work together to perform one of the mission's medical experiments, Detailed Supplementary Objective 462, designed to measure central venous pressure during space flight. Sullivan is applying a gel to a transducer that will be placed on McCandless' jugular vein to collect data. 6) Shriver uses the Hasselblad to take photographs from the flight deck's overhead window. 7) Sullivan meets a friend, her EMU, in the airlock. One patch on the suit's chest is the STS-31 mission patch; the other is the patch of the Weightless Environment Training Facility (WETF), where astronauts train for space walks in a large swimming pool.

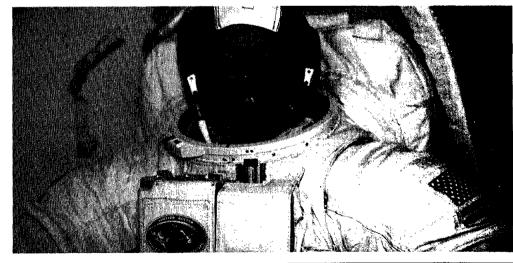














Hubble Space Telescope





Payloads team hangs STS-31 plaque

Members of the Mission Control payloads team earned the honor of hanging the STS-31 plaque following the successful completion of the Hubble Space Telescope (HST)

Payloads Officer Nellie Carr was singled out for coordinating operations support and leading the team through the difficult deployment when the solar arrays failed to unfurl properly, said Lead Flight Director Bill

Reeves. Reeves also cited Jeff Hanley, Jeff Larson, Sherry Boyd and Pete Sprunger for their contributions.

'The whole team can be very proud of its contribution to this historic mission." Reeves

Hanley came up with the idea of modifying the shuttle communications system to enable communication with HST through the S-band system instead of the Ku-band system, increasing coverage essential to the deployment. Larson, Boyd and Sprunger were instrumental in developing command capability and malfunction procedures implemented during deployment, he said.

Rummel to manage science payloads

Dr. John A. Rummel, Ph.D., has been appointed director for science payloads in the Space and Life Scien-

ces Directorate.

Rummel is returning to NASA after spending sixyears running his own company, MAP Systems. He first joined JSC in

1966, and served as principal investigator on Apollo and Skylab physiology experiments. He was Spacelab Life Sciences-1 mission scientist from 1980-84.

Brown manages payload specialist activities

Betty G. Brown has been appointed payload specialist manager at JSC, and will coordinate flight preparation activities as outlined in the Payload Specialist Operations and Integration

She will work all JSC requirements, sche-



Carr









Brown

duling and accommodations activities related to shuttle flight preparation of payload specialists and space flight participants for the Space Shuttle Support Office in the Flight Crew Operations Directorate.

Brown, who came to JSC in 1973, had been a customer relations specialist in the Space Shuttle Customer Integration Office since 1983. In that position, she worked with payload customers and was in charge of the Customer Support Room in Mission Control.

Jones finishes marathon

Coye "Mac" Jones, technical assistant and office manager in the Space Shuttle Engineering Integration Office, recently completed the Boston Marathon.

Jones finished the April 16 run with a time of 3 hours, 29 minutes and 52 seconds. Winner

Jones of the race was Gelindo Bordin of Italy, with a time of 2 hours, 8 minutes, 19 seconds.

The grueling course over hilly terrain provided different challenges than relatively flat Texas courses, which are difficult because of the heat and humidity, Jones said.

Davis earns honors

Margaret E. Davis, secretary to Center Operations Deputy Director Grady McCright, recently received the Marilyn Bockting Award for Secretarial Excellence.

Davis was cited for her quick adaptation to the office since joining it in July 1988, and for her ability to deal with calls and letters from state and local political figures, top management of attorneys' firms, banks, construction and architectural firms, developers and vendors of all kinds.

She received a plaque and a \$500 stipend.

JSC experts judge science fair projects

Fourteen JSC representatives employed their skills and expertise to judge almost 800 science exhibits in the 41st Annual International Science and Engineering Fair this past week in Tulsa, Okla.

The purpose of the fair is to stimulate in young people an active interest in science and engineering. Entries are received from students at the high school level who have qualified in local, city and regional fairs.

NASA selects 10 awards for aerospace research in the categories of aeronautics, computers, electronics and communications, life sciences, mathematics, physical sciences, propulsion, robotics and space vehicles. Judging took place Wednesday.

Judges from JSC were Stephen J. Feaster, research pilot, Aircraft Operations Division; Jon D. Erickson, chief scientist, Automation and Robotics Division: Mark V. Glorioso, communications and tracking project engineer, Tracking and Communications Division; Kenneth K. Kroll, aerospace engineer for liquid propulsion systems, Propulsion and Power Division; Pedro A. Martinez, computer engineer, Instrumentation and Processor Applications Branch, Flight Data Systems Division;

Paul O. Romere, shuttle technical manager for aerosciences, Navigation, Control and Aeronautics Division; Michael N. Rouen, deputy chief, Extravehicular Activity Branch, Crew and Thermal Systems Division; Lebarian Stokes, aerospace engineer. Robotics Systems Evaluation Branch, Automation and Robotics Division; Dr. Daniel H. Anderson, computer systems manager, Solar System Exploration Division; Dr. Jeffrey R. Davis, chief, Medical Operations Branch, Medical Sciences Division: Dr. Michael Foale, astronaut; Dr. Frank A. Kutyna, chief neuroscientist, Space Biomedical Research Institute; Dr. Doug Ming, staff scientist, Space Resource Utilization Office; and James D. Poindexter, educational specialist, Public Affairs Office.



JSC Photo by Jack Jacob

A memorial plaque in the Bldg. 17 food laboratory commends the late Rita Rapp for taking astronauts from "cubes and tubes" to conventional meals and utensils.

Rapp memorial unveiled

By Pam Alloway

Officials recently unveiled a memorial plaque to Rita M. Rapp, a pioneer space food scientist and shuttle food subsystems manager

Rapp, a physiologist and nutritionist, died at age 61 in July 1989 following a long illness. She joined NASA in 1961 during the Mercury

hand for the unveiling were Brewsof space shuttle operations; Dr. conventional meals and utensils.

Carolyn Huntoon, director of JSC's Space and Life Science's Directorate; Dr. Don Robbins, deputy director of the directorate; Chris Perner, chief of the Man Systems Division; and Dr. Charles Bourland. subsystem manager of space station food.

Shaw, a former astronaut and commander of the STS-28 crew, program and continued her work flew a small gold shuttle pin ir through the Space Shuttle Program. Rapp's memory during his final flight The plaque will be on permanent in August 1989. The pin was incordisplay in the Bldg. 17 food lab. On porated into the plaque, which commends Rapp for taking astroter Shaw, NASA's deputy director nauts from "cubes and tubes" to

JSC workers' children receive scholarships

By Pam Alloway

Kristen N. Jaax, daughter of a JSC employee, is one of the three recipients of the 1990 NASA College Scholarships.

Her father, James R. Jaax, is deputy chief of the Engineering Directorate's Crew and Thermal Systems Division. She will graduate first in her class at Clear Lake High School this month.

Jaax plans to attend Stanford University this fall to pursue a degree

in biomedical engineering.
The NASA College Scholarship Fund Inc., established in 1982, was endowed by Pulitzer Prize winning author James A. Michener.

Other NASA College Scholarship recipients are: Timothy O. Jarrett, son of Langley Research Center employee Olin Jarrett Jr., and Sandor G. Lehoczky, son of Marshall Space Flight Center employee Sandor L

The NASA Exchange-JSC Scholarship program also has announced its 1990 winners. The scholarship, separate from the NASA College Scholarship, began in 1967. Each

scholarship provides \$4,000, or up to \$1,000 a year, for study at any university.

This year's winners are:

 Anne Jeannette Bobo, daughter of Sue E. Bobo of the EVA Branch in the Engineering Directorate's Crew and Thermal Systems Division. Bobo, a June 1989 graduate of Clear Creek High School, plans to enter Texas Women's University in Houston to pursue a bachelor's degree in nursing.

 Jeffery Scott Richeson, son of George L. Richeson Jr. of the Flight and Ground Support Systems Section in the Mission Operations Directorate (MOD). Richeson, a June 1989 graduate of Clear Lake High School, plans to study computer science and math at Baylor University.

 Angela Christine Snyder, daughter of Richard D. Snyder of the Orbit Procedures and Flight Data File Section, also in MOD. Snyder, 1988 Friendswood High School graduate, is majoring in Health Science at Texas A&M University. She plans to study nursing at the University of Texas Medical Branch in Galveston.

Hubble images expected soon

(Continued from Page 1)

star cluster of about 150 stars visible to ground observers in the Earth's southern hemisphere in the constellation Theta Carina or "Ship's Keel." Whether that image is taken on Wednesday or Friday depends on the number of bootstrap operations that must take place.

Engineers also have built diagnostic tests that will be uplinked to the telescope to help determine the cause of a slight oscillation, or wobble, in the roll axis of the HST's fine guidance sensors. The sensors are part of the telescope's pointing and control system, and during its most sensitive uses will allow astronomers to measure the geometry of the universe and the exact distance between stars.

Another nagging problem is a shaking motion when the telescope

passes from shadow into sunlight. Engineers are studying both problems and believe they might not be with the telescope but with the computer program that guides its every move.

This past week, operators completed a number of objectives including: the alignment of the fixed head star tracker to the rate gyro assembly; bringing the high speed photometer to its ready, or "hold," state; verifying the faint object camera computer; checking the voltage readings on the ing and monitoring an ion gauge in the telescope's aft shroud; and uplinking new ephemeris tables.

The STS-31 crew placed the \$1.55 billion space telescope in a 380-mile orbit April 25, starting it on its 15-year mission of exploring the universe.

Astro-1's vision of the universe, a look beyond

(Continued from Page 1)

energy in electron volts of each Xray detected. Accurate pointing is achieved by a two-axis pointing system (TAPS).

Astro observations will begin about 23 hours after Columbia has completed its maneuvering burn to circularize its orbit at 190 nautical miles. BBXRT will be activated about 13 hours after orbital insertion.

STS-35 Commander Vance Brand said the crew cabin will be crowded on this mission, the first sevenmember crew to fly since the Challenger accident. While it is a Spacelab mission, there will be no added pressurized volume for the crew to

first large crew to deal with partial pressure suits, which will be stored in the airlock when not in use.

Brand said the crew will divide into two shifts, red and blue, to support around-the-clock observations by the telescopes. The red team will consist of Pilot Guy Gardner, Mission Specialist Robert Parker and Payload Specialist Ronald Parise. The blue team will be Mission Specialists Jeff Hoffman and Mike Lounge, and

Payload Specialist Sam Durrance. 'We're excited about it," Brand said. "We're carrying instruments that in the past mainly have been used on small rockets. Instead of

move around in, and this will be the getting a few minutes of observing, we'll get nine or 10 days continuous observing time. We think this has tremendous scientific potential."

The telescopes often will work together, taking different measurements of the same object.

The three ultraviolet telescopes we have are co-pointed generally at the same target all the time," Parise said. "We're unique in that we can make several types of observations simultaneously of the same target."

Lead Flight Director Gary Coen said observation targets will change every half hour, which will create a busy schedule.

"In order to optimize the number

of stars we can see and the galactic objects that the scientists can point at, we have a pretty tight maneuver schedule," he said. "Over the course of the nine-day mission, we're doing some 240 attitude maneuvers to repoint the orbiter and to allow the IPS and the BBXRT to get new

The mission also will be a pathfinder for Space Station Freedom.

"I'm really looking forward to this mission for what it will teach us about how to do science operations continuously and for relatively long duration," said Lounge, who, when not flying and training, works on space station projects.

Space News Roundup

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Editor..... Kelly Humphries Associate Editors Pam Alloway Kari Fluegel

NASA-JSC