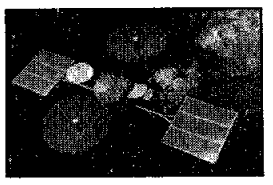
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas



System upgrade

A new satellite and ground station are helping NASA upgrade its communication system. Story on Page 3.

JSC Picnic

Astroworld's Tasmanian Devil greets JSC employees as they spend a day at the park. Photos on Page 4.

Space News Roundup

Vol. 34 May 19, 1995 No. 20

JSC video excellence wins prize

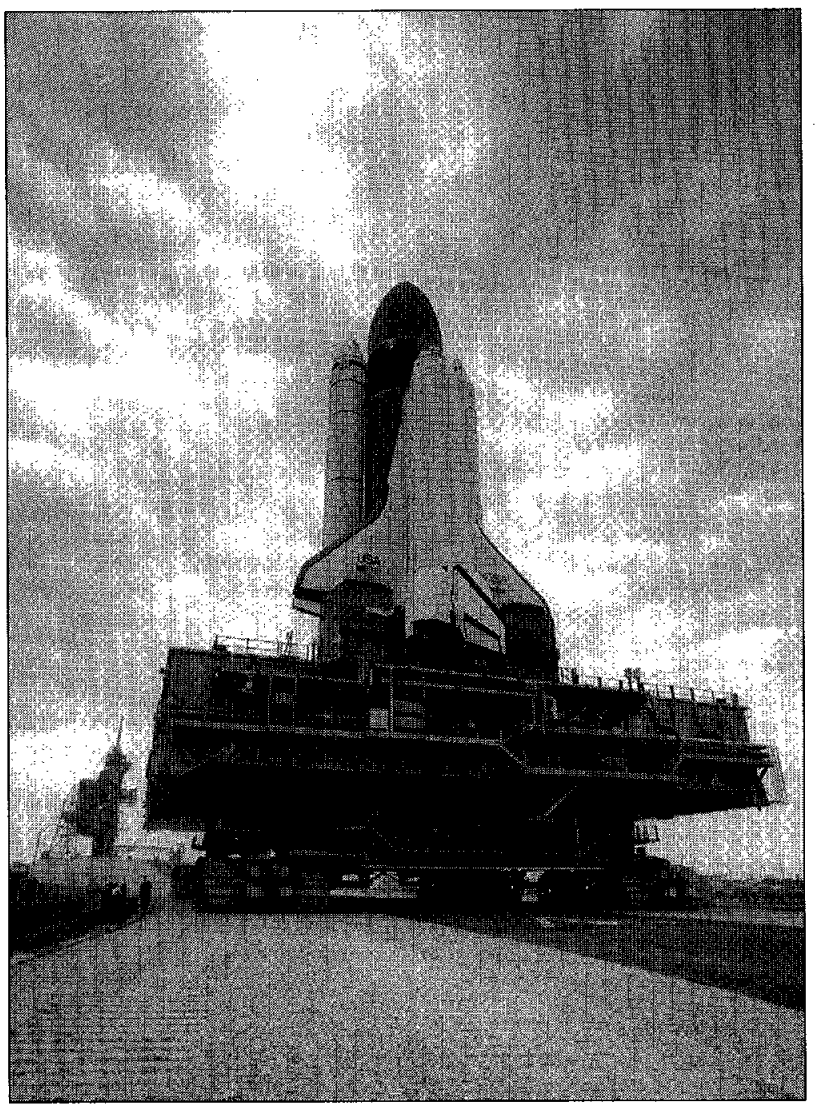
The 1995 Telly Awards recently recognized JSC for its excellence in video production.

The Information Services Division and Taft Broadcasting Co. received four awards in the national competition that recognizes excellence in non-network television, cable, film and video productions. The total number of entries was more than 8,600, including Turner Broadcasting, Coca Cola, Disney, MTV and Boeing, among others.

In the corporate image category, the winner was the "JSC Video Montage." This pictorial representation of JSC's design, development, operations and science and technology activities was a joint venture between the Publications and Administrative Support Branch and the Imagery Services Branch. Team members included Larry Sweet, Lynn Buquo, Peggy Wooten, David Krenek, Juan Galvez, Steve Candler, Marcus Havican, Silvia Stewart, Scott Schultz, Gary Rogers, Marco Zambetti, Paula Vargas, Ray Brown and Lora Cole.

"Living in Space" won in the education category. Aimed at teaching elementary students how astronauts live in microgravity, it was created by Deidra Baker, Pat Lowry, Emmett Durham, Ray Brown, Mark Turner, Charles Boehl, Marco Zambetti, Gary Rogers and Lora Cole. The video featured the STS-56 crew, including

Please see **AWARDS**, Page 4



NASA Photo

The Space Shuttle *Atlantis* rolls out to Launch Pad 39A aboard the crawler-transporter. The historic STS-71 mission is scheduled for a late June launch to link-up for the first time with the Russian Space Station Mir. *Discovery*, which will launch June 8 on the STS-70 flight to deploy a Tracking and Data Relay Satellite, joined *Atlantis* on the pad last week.

Discovery dress rehearsal clean; TDRS checks out

With all preparations moving ahead on schedule, the five astronauts who will fly America's 100th human space mission ran through a flawless dress rehearsal of their countdown procedures at the Kennedy Space Center in advance of their liftoff aboard the shuttle *Discovery* on June 8.

Commander Tom Henricks, Pilot Kevin Kregel, and Mission Specialists Don Thomas, Nancy Currie and Mary Ellen Weber boarded *Discovery* on Launch Pad 39B at KSC Friday for the final hours of a simulated countdown and engine ignition.

STS-70 DISCOVERY

"We're looking forward to this 100th mission as a symbol of the excellence of NASA's achievements through more than three decades of human space flight operations," said Henricks, who is embarking on his third flight into space.

The primary objective of the STS-70 mission, the 69th flight in shuttle history, is the deployment of the sixth Tracking and Data Relay Satellite to complete NASA's current constellation of communications stations in geosynchronous orbit.

"We're looking forward to the deployment of TDRS-G to round out the fleet," said Lead Flight Director Rob Kelso. "The deployment of this satellite will be an important plus to NASA's ability to provide global communications to and from its orbiting spacecraft."

A firm launch date, launch time and mission duration for *Discovery*'s flight will be set at NASA's traditional Flight Readiness Review, to be held at KSC next Friday.

Discovery will be thrust into orbit by its twin solid rocket boosters and three hydrogen-fueled main engines, one of which is the new Block One engine, incorporating a new high pressure liquid oxidizer turbopump, which will have a longer lifetime without periodic inspections. The new engines will increase safety margins and reliability while cutting maintenance costs.

Waiting in the wings for launch in late June is the shuttle *Atlantis*, poised to carry five NASA astronauts and two Russian cosmonauts into orbit for the first docking of a shuttle with the Russian Space Station Mir.

Please see **STS-71**, Page 4

Space walks prepare Mir for Spektr's arrival

Mir 18 Commander Vladimir Dezhurov and Flight Engineer Gennady Strekalov conducted their first two space walks of the mission while Cosmonaut Researcher Norm Thagard supported them from inside the orbiting space station.

Saturday, the day after the first space walk, Thagard surpassed the cumulative time in space record for an American as he began his eighty-fifth day in space. His time on the Mir-18 mission, combined with his four previous space shuttle flights—STS-7, STS-51B, STS-30 and STS-42—passed the 84 days spent aboard Skylab by Astronauts Gerald Carr, Edward Gibson and William Pogue from Nov. 16, 1973, to Feb. 8, 1974.

The first space walk began at 11:20 p.m. JSC time last Friday when Dezhurov opened the hatch of the air lock in Mir's Kvant-2 module and ventured outside the space station. Strekalov soon followed, making his way to the pre-arranged rendezvous point at the base of the station's cargo boom, called Strela.

The primary purpose of the space walks was to begin preparing Mir for the arrival of the Spektr research module later this month by installing electrical cable attachments and adjusting solar array actuators. They also practiced folding three panels of one solar array on the Kristall module in preparation for the second space walk that took place Wednesday. They also were scheduled to remove a panel of space radiation detectors, called "Trek" but because they were running behind schedule, controllers on the ground decided to postpone that task until a later space walk.

MIR-18 THAGARD

The space walk, which lasted 6 hours and 8 minutes instead of the scheduled 5 hours and 20 minutes, went without incident. Thagard's role was to relay instructions from the ground to his fellow cosmonauts and to provide them with instructions from reference manuals when the space station was not in radio contact with ground controllers.

The primary focus of Wednesday's six and a half hour space walk by Dezhurov and Strekalov was to fully stow a solar array on the Kristall module that was partially stowed as a test during the first space walk. Thagard sent "start" and "stop" commands to the solar array from inside the station while his crewmates assisted by guiding each panel into its canister throughout the process.

The electrical power generating array was removed and relocated to the Kvant-1 module at the opposite end of the Mir station, but the space walkers ran out of time to reattach the array. An additional space walk to finish the task is planned for Monday.

At least two more space walks will be needed to finish preparing Mir for the arrival of its newest science module—Spektr, scheduled for launch today. Following a six-day phasing toward the space station, Spektr is scheduled to dock with Mir at 10:20 p.m. Thursday.

In preparation for the space walks, most of the communications between the Mission Control Center in Kaliningrad, and the Mir-18 crew focused on procedures and timelines. The preparations included the checkout of the four space suits on board, two of which were used for the space walks.

The Mir crew also is continuing its work on several medical experiments.

Pilot program aims to save bucks on Headquarters travel

JSC employees traveling to NASA Headquarters may want to take a second look at their lodging plans now that NASA has instituted a pilot program that bills Headquarters instead of centers for lodging at certain hotels.

In an effort to save travel money, NASA Headquarters has entered into contracts with three hotels, Holiday Inn-Key Bridge, Quality Hotel and Quality Inn-Iwo Jima. All three hotels are available immediately for use.

In the fall, NASA Headquarters will analyze the results of this pilot program and determine whether it is feasible to continue.

Anyone traveling under NASA-approved orders may use the hotels. When travelers choose not to use one of the three hotels or the hotels are filled, the centers will pay for the lodging expenses. When the preferred providers are used, NASA Headquarters pays for the cost.

The traveler, or support staff, should make reservations directly with the preferred provider explaining that the traveler is using the NASA pilot program. The remarks section of the travel order should include the hotel name, confirmation number, contract number and a statement referencing that the traveler is not to be reimbursed for lodging expenses while at NASA Headquarters.

Travelers must present a copy of the travel order at the hotel desk upon check-in. A copy of the travel order must be faxed to Joyce Smith at (202) 358-3049 within one workday upon completion of travel. This will be used to validate contractor invoices.

For more information call the Travel Accounting Office at x34011.

IN REMEMBRANCE—The crew of JSC's WB-57F aircraft recently traveled to Hawaii to map underground lava flow of the Pu'u O'o volcano for the Environmental Task Force. They took a moment to honor Astronaut Ellison Onizuka's grave. From left are, Kevin Bishop of Lockheed, Shelly Hilden of the Aircraft Operations Division, Jay Granger of Lockheed, Steve Feaster, Bud Meins and John Lamb of the Aircraft Operations Division and George Mulcahy of Dyncorp.

Placement center open

The Career Transition Assistance Program center is now open to assist JSC civil servants with outplacement help.

The CTAP center in Bldg. 45, Rm. 308 is open weekdays, 9 a.m.-5 p.m. and will remain open, by appointment, until 7 p.m. on Tuesdays and Thursdays. The center offers computers, telephones, laser printers, a copier, fax machine, library, and career counselors to help JSC civil servants in career transition.

Employees will be required to attend a workshop prior to using the center. The day-long workshops cover a variety of topics.

All current JSC civil service and buyout personnel are eligible to attend the workshops and use CTAP facilities. Employees may obtain workshop dates or sign up by calling x34300.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

World Championship Ice Skating: 8 p.m. June 15 at the Summit. Tickets cost $30.50 for upper prom, $45.50 for lower prom.

Loving Feelings Concert: 7 p.m. Sept. 30 at the Summit. Tickets cost $32.50.

Schlitterbahn: Tickets cost $17.80 for adults and $15.30 for children 3-11.

Sea World: Tickets cost $23.50 for adults and $16.25 for children 3 -11.

Astroworld: Early bird tickets cost $14.70. Season passes cost $45.50.

Six Flags: Tickets cost $23.70 for a one day pass, $31.75 for two day pass and $20.30 supersaver not valid on weekends in June July and August.

Fiesta Texas: Tickets cost $20.35 for adults and $15.80 for children 4-11 and senior citizens over 55.

Moody Gardens: Discount tickets for two of three different attractions: $9.50

Space Center Houston: Discount tickets, adult, $8.75; child (3-11), $7.10.

Metro tickets: Passes, books and single tickets available.

Movie discounts: General Cinema, $4.75; AMC Theater, $4; Sony Loew's Theater, $4.75.

Stamps: Book of 20, $6.40.

JSC history: *Suddenly, Tomorrow Came: A History of the Johnson Space Center*. Cost is $11.

JSC

Gilruth Center News

Sign up policy: All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

EAA badges: Dependents and spouses may apply for photo identification badges from 7 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

Weight safety: Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. May 25 and June 14. Pre-registration is required. Cost is $5.

Defensive driving: Course is offered from 8:15 a.m.-3 p.m. Saturday. Next class is June 10. Cost is $19.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays.

Aikido: Martial arts class meets from 5-7 p.m. Tuesdays and Wednesdays. Cost is $25 per month. New classes begin the first of each month.

Ballroom dancing: Cost is $60 per couple. For additional information call the Gilruth Center at x33345.

Sailing class: NASA Sailing Club will hold classes from 9 a.m.-noon Saturdays from May-June. For more information call Richard Hoover at 996-7716.

Fitness program: Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

JSC

Dates & Data

Today

AIAA symposium: The American Institute of Aeronautics and Astronautics Houston Section will host the 20th annual Technical Symposium from 8:30 a.m.-4:30 p.m. May 19 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. Space Station Program Office Technical Manager Bill Shepherd will discuss "International Space Station: The Next Iteration" at an 11:30 a.m. luncheon. Registration, which includes lunch, is $3 for AIAA members, $5 for non members. Reservations are needed for lunch only; call Tanya Bryant at x31175 or Sara Leggio Follett at 282-3160. For more information, contact Kam Lulla at x35066, or Brenda Ward at x47563.

Cafeteria menu: Special: fried chicken. Total Health: vegetable lasagna. Entrees: pollock hollandaise, beef stroganoff, vegetable lasagna. Vegetables: steamed broccoli, carrots vichy, Italian zucchini, breaded okra.

Monday

Cafeteria menu: Special: meat sauce and spaghetti. Total Health: potato baked chicken breast. Entrees: wieners and beans, sweet and sour pork chop, potato baked chicken, steamed fish, French dip sandwich. Soup: cream of broccoli. Vegetables: French cut green beans, seasoned rice, California vegetables, buttered beans.

Tuesday

BAPCO meets: The Bay Area PC Organization will meet at 7:30 p.m. May 23 at League City Bank. For more information call Guy Thibodeaux at 333-5340.

Cafeteria menu: Special: smothered steak with dressing. Total Health: baked potato. Entrees: beef stew, liver and onions, shrimp Creole, baked chicken, fried cod fish, French dip sandwich. Soup: navy bean. Vegetables: steamed rice, seasoned cabbage, corn O'Brien, peas.

Wednesday

NMA meet: The National Management Association will meet at 5 p.m. May 24 at the Gilruth. For more information call Kathy Kaminiski at x38706.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon May 24 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at 333-7679.

Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. May 24 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Elaine Trainor, x31034.

Cycle club: The Space City Cycle Club will meet for a 25-mile ride beginning at 6 p.m. May 24 at the University of Houston Clear Lake soccer field. For more information on this ride and weekend rides call Mike Prendergast at x45164.

Cafeteria menu: Special: salmon croquette. Total Health: baked potato. Entrees: roast pork, stir frybaked perch, steamed fish, vegetable lasagna, Reuben sandwich. Soup: seafood gumbo. Vegetables: mustard greens, okra and tomatoes, vegetable sticks, lima beans.

Thursday

Radio club meets: The JSC Amateur Radio Club will meet at noon May 25 in Bldg. 16 Rm. 253. For more information call Larry Dietrich at x39198.

NASACOM meets: The NASA Commodore's User's Group will meet at 7:30 p.m. May 25 at the Clear Lake Park Bldg. For more information call Glenda Souliere at x31764.

CLANG meets: The Clear Lake Area Network will meet at 6:30 p.m. May 25 at the Center for Advanced Space Studies. For more information call Jason Levy at x46220.

Cafeteria menu: Special: stuffed cabbage rolls. Total Health: baked potato. Entrees: beef tacos, ham and lima beans, pork and beef egg rolls, steamed fish, catfish, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, green beans, buttered squash, pinto beans.

Friday

Cafeteria menu: Special: baked chicken. Total Health: roast beef au jus. Entrees: deviled crab, baked chicken, beef cannelloni, steamed pollock, Reuben sandwich. Soup: seafood gumbo. Vegetables: seasoned carrots, peas, breaded okra, steamed cauliflower.

May 29

Memorial Day: Most JSC offices will be closed in observance of the Memorial Day holiday.

June 2

ABWA meet: The Clear Lake Area Chapter of the American Business Women's Association will meet at 5:30 p.m. June 2 at Space Center Houston's Silver Moon Cafe. For additional information call Nancy Hutchins at x34006.

June 8

Airplane club meets: The MSC Radio Control Airplane Club will meet at 7:30 p.m. June 8 at the Clear Lake Park Community Bldg. For additional information call Bill Langdoc at x35970.

June 14

PSI meets: The Clear Lake/NASA Area Chapter of Professional Secretaries International meets at 5:30 p.m. Feb. 8 at the Holiday Inn on NASA Road 1. Patsy Mitchell will present "Leadership Without Authority." For additional information, contact Elaine Kemp x30556.

JSC

Swap Shop

Property

Rent: Condo, Seawall, 1BR, furnished, dly/wkly. Pete, 532-4237.

Sale/Rent: Boat slip on Clear Lake w/roof & motorized boat hoist for power boats, $7.5k sell/$125/mo lease. 474-4922.

Sale: Condo in Webster, 2-2-2CP, FPL, ceiling fans, new D/W, mini blinds, refrig, W/D conn, $39.9k. x47513 or 280-0285.

Sale: Egret Bay condo, 2-1-2CP, FPL, W/D, all appl, new carpet/tile/roof, $45k. x41036 or 333-4577.

Rent/Lease: 2 lots, Lake Livingston, $70/mo. James, x36666.

Sale: Waterfront .5 acre lot, Dickinson Bayou, new bulkhead, beautiful trees, $85k. x31370.

Rent: Hilton Head, South Carolina, Marriott's Harbor Pointe, 2-2, $750/wkly, 7/15-22. Bill, x47311.

Sale/Lease: League City, Meadow Bend, 1,800 sq ft, 3-2-2, FPL, sunroom, $950/mo + dep or $77.9k. x31769 or 332-1054.

Sale: Camino South, 3-2-2, xtra lg, bright kitchen area, new A/C, large lot, 75.9k. 480-3838.

Rent: Condo, 1-1-1CP, W/D, appl, upstairs, immediate occupancy, ref req, $390/mo + $300 dep. Richard, x31488 or 286-6915.

Rent: Winter Park, Co, 2-2, furnished, sleeps 6. 488-4453.

Sale: Bayridge, 3-2-2, split plan, new gar door, A/C, new carpet, ceramic tile kitchen, patio cover, fenced. Becky, x38521 or 334-3995.

Sale: Alvin off FM 517, 3 acres, $9k nego. 409-925-2421.

Sale: Jamaica Beach Canal lot, 80'x50', $12 nego. 409-925-2421.

Sale: Wildwood, Tx, lot 80'x120', retirement community, $2.8k; lot 50x120, located in Canyon Lake Estates, north of New Braunfels, Tx, view of Canyon Lake, $4.2k; lot 50'x450', located south of dam "B" in Barlow Lake Estates, $1.8k. 992-9790.

Cars & Trucks

'91 Nissan Sentra XE, white, 5 spd, cass/stereo, 4 dr, 77k mi, $7k. Larissa, x41285 or 482-2940.

'95 Toyota 4Runner, wht, 2WD, auto loaded, low mi, $22k; '83 280ZX, 5 spd, silver, T-tops, 153k mi, $1.2k obo. Larissa, x41285 or 482-2940.

'93 Ford Taurus, charcoal, pwr, tinted windows, 37k mi, ex cond, $10.9k. x37113 or 286.3019.

'85 Mitsubishi truck, $650. Sheryl, x38243 or 482-8490.

'90 Dodge custom van, built-ins, oak accents, loaded, low mileage, extended warranty, $12k. Diane, 244- 7129.

'88 GMC PU ex cab, long wheelbase, SLE package, 5.7 liter w/OD, PS/PW, A/C, AM/FM/cass, toneau cover & toolbox, new tires/brakes, ex cond, 99k mi, $8.5. 333-6277 or 339-2773.

'63 Classic Chevrolet Corvair, Greenbrier sports van, green/white paint, no rust, OBO. 482-7642.

'84 Mazda RX-7 GSL-SE, black/red, 5 spd, spoiler, sunroof, AM/FM/cass. $2,950. 582-0415.

'88 Toyota Camry, 4 dr, auto, A/C, cruise, stereo cass, $4.7k. 481-2535.

'75 Ford F150 truck, 390, V8, ex cond, A/C, PB/PS, duel tanks. 480-3329.

'89 Mustang, loaded, white, ex cond, 63k mi, $6.6k. Lenny, 485-3821.

'91 Pontiac Sunbird LE convertible, red w/wht top, gray interior, auto, PW/PL, 44k mi, ex cond, $9.9k. Jessica, x36792 or 332-6588.

'93 Nissan Sentra XE, 4 dr, std, pwr options, cruise, 22k mi, $9.5 nego. Dilhar, 480-3233 or 488-2549.

'90 Toyota Tercel, red, 5 spd, 2 dr, sedan, AM/FM/cass, A/C, 65k mi, $4.8k. 538-6012.

'77 Buick Park Avenue, A/C, pwr, $900 obo. Glenn, x38067 or 480-7019.

'88 Mazda 626 LX, loaded, moonroof, 5 spd, wht ext/burgundy int, ex cond, well maint, $6k. Jeff, 335-2637 or 286-6785.

'85 Cougar, V6, loaded, good cond, $2k. 326-6027.

'86 Pontiac Fiero 2M4, gold, auto, AM/FM, 80k mi, good cond, runs great, $2k. David, x34700.

'82 Pontiac Gran Prix, $650. Joe, 409-948-4931.

'64.5 Mustang, red, 289, looks & runs good, $3k obo. 486-0972.

'83 Subaru GI wagon, AM/FM/cass, pwr, cruise, ex int, new battery/tires. $900/obo. 334-4313.

Cycles

'82 Honda V45 Sabre, low mi, recent tune up, looks & runs great, $2.4k. 338-0205 or 538-8890.

'81 Suzuki 400GN, low mi, good shape, $650 obo. x34908 or 409-925-7224.

'88 Honda CR250, new front tire & more, set for performance, $1.4k. 992-0424.

Boats & Planes

Laser 2 sailboat w/trailer, spinnaker rigged, trap, vests, $1.1k obo. x41095 or 486-8185.

'88 Invader, 210 cuddy cabin, I/O 200 hp Merc, galvanized trailer, loaded, ex cond. 997-6141.

Sovereign, 24', ex cond, extra jib, depth sounder, head, stove, sleeps 4, elec start Johnson OB, best offer. Mike, 282-2787 or 286-1691.

'76 Ranger, 17' bassboat, 150 Merc, pwr trim, depth finder, trlr, trolling motor, $2.5 obo. Mick, 482-0167.

'78 Glastron, 20', 200 Johnson, cuddy cabin, trailer, $350. 489-9401.

'87 Marlin Empress, 21', 260 hp Merc, cutty cabin w/cabinet dual batt sys, dual tanks, trailer, $7k. Phil, 212-1339 or 337-6614.

Hollywood Bowrider, 16', 60 hp Evinrude, galvan trailer, depth finder, navy top, good cond, $1.2k. Mark, x36126 or 326-1192.

Coleman canoe, 15', green, 2 paddles, $250. Leslie, x38796.

Rent: Piper Arrow II, IFR certified, 135 kts cruise, ex cond, at Clover Field, $75/hr. 482-9375.

'93 Crownline, 20', inboard/outboard, 5.7 liter OMC eng, depth finder, McClain trailer, $13.5. Bob, 244-4431 or 286-9902.

Audiovisual & Computers

Mac II, 8 MB RAM, 130 MB HD, color monitor, kybd, mouse, S/W, $650; 286 computer, 1 MB RAM, 40 MB HD, 5.25" FD, monitor, kybd, $175. 996-5739.

Magnaplaner MGI speakers, 1 pr, $395 obo. x47665 or 471-2934.

IBM PC w/640KB RAM, 65 MB HD, 2 5.25" FDs, 13' color monitor, mouse, kybd, DOS 5.0, clock, documentation, $125. 280-0502.

TI Dot matrix printer, $25; Behive VT100 compatible terminal, $10. 488-6521.

Macintosh laptop computer 145B w/system 7.5, $500 obo. 280-8923.

Amiga 500, ext disk drive, HD, monitor, huge S/W collection, $1k. Scott, 488-4569.

486SX33, 4 MB RAM, 100 MB HD, 3.5 FD, 5.25 FD, VGA monitor & card, DOS 6.20, Windows 3.1, various S/W, $950. 484-0527.

Freelance, Dashboard, Sidekick, Microsoft C compiler, more S/W. Jeff, x31975.

Aegis Guardian of the Fleet computer game for DOS CD-ROM, manual, $10. Lia, 565-5683.

Musical Instruments

Lewis violin, student sized .75 w/case, ex cond, $400. x34656 or 480-7127,

Pets & Livestock

Persian kitten CFA reg, black, male, born 2/7/95, $300. 538-6012.

AKC Miniature Schnauzer puppies, salt/pepper color, shots wormed, tails docked, $225. x41000 or 997-9263.

Miniature Pinscher puppies, AKC reg, 3/1/95, blk/tan male, red female, tails docked, $300; ears docked, $350. Cheyenne, x31016 or 206-5545.

Household

Modern glass dining table, pedestal base, rect beveled glass, 4 upholstered Parson's chairs, black, $450/all or sell sep. Katie, x33185.

Sears dryer & Maytag washer, $150/both. 334-4470.

Sealy qn size box springs , $100. Doc Pepper, 282-3130 or Laura Pepper , 482-8515.

Coffee table & 2 end tables, black lacquer, $80; child's chest of drawers, $50. x36309 or 474-9747.

King sz oak waterbed w/semi motionless matt, 6 drawers, hdbd w/mirror & shelves, $250 obo. 280-0285.

Large contemporary golden/tan naugahyde swivel chair w/foot stool, $40. x31370.

RCA color TV, solid wood console, 27", stereo sound, new $950 sell $650/cash. 244-7129.

Ivory man made leather sofa/loveseat, $650. 996-0152.

Bassett solid pine four-poster bed, new $700 sell $400. Vanessa, 282-4563.

Coffee table, oval, ball-in-claw curved leg, mahogany w/in-lay banding, ex cond, $275; ginger jar style lamps, 2 white-on-peach w/shades, ex cond, $50. x34656 or 480-7127.

Matching leather sofa & loveseat, hunter green, $1.6k; recliner, hunter green, $350. 482-4762.

Round kitchen table, 40", 6 chairs, xtra leaf, solid wood, oak finish, $450. 333-6573 or 334-5843.

Loveseat, brown velour print, good cond. 941-3262.

Natural wood table, & 4 chairs, solid wood w/butcher block laminate top, $100. Jeff, x31975 or 286-1935.

Rectangular cargo dining table, new $300 sell $240. 326-1526.

Maple country kitchen table, 36"x72" w/4 country ladderback chairs; sq cocktail table, cherry blk, brn southwest loveseat w/5 multicolored pillows, all nego. x37788 or 992-4384.

Tappan gas built-in oven, upper oven/lower broiler, blk glass & chrome front panels, $250 obo. Dennis, x34405 or 532-3312.

Rattan, walnut color, table w/6 chairs, dk aqua cushions, $200; armless chair, mauve print, $50; misc tables, $25-30. x35804 or 474-5610.

RCA color TV, 21", table model ex cond, $100; Panasonic VCR, ex cond, w/manual & Lexan dust cover, $100. x33989 or 482-7079.

Wanted

Want personnel to join VPSI van pool, from Sugarland & Southwest Houston to NASA area. Alice, x35234.

Want personnel to join VPSI Vanpool departing Meyerland Park & Ride lot at 7:05 a.m. for JSC, on-site personnel working the 8 a.m. - 4:30 p.m. shift, Travis Moebes, x45765 or Don Pipkins, x35346.

Want personnel to join vanpool, departing Southwest parking lot at 6:50 a.m. for JSC & off-site locations, 7:30 - 4:00 p.m. shift. Susan Gaynor, 282-5447 or Ed, x36124.

Want double stroller, ex cond. Lia, 565-5683.

Want clean, safe garage apt or private living area, C.L. area, have sm dog, no furn needed. Becki, 944-3523.

Want '84/'85 Honda Accord, 4 dr wrecked or incomplete, need for spare parts. Troy, 486-5707.

Want low priced school/work car or truck. 271-7011.

Want roommate(s), 4-2.5-2, 2-story house, Seabrook, fans, sep phone lines, W/D, $350/mo. 474-4742.

Want children's toys for ages 2 & up, especially larger items. x37306 or 486-0177.

Want couch for college student. Ron, x32658 or 488-4153.

Want cheap, clean full sz mattress & box springs. 282-3200.

Want tickets for return visit to Astroworld that were given as part of JSC Picnic offer, will pay $4 ea for 12 tickets. Joe, x38851.

Want housemate to share apt or house. Rob, x32585 or 332-4301.

Want donations for needy families w/infants, toys & clothes up to 6X, sz new born. Bea, x31094 or 948-0282.

Miscellaneous

President & First Lady Lifetime membership, paid thru 4/96, $600 obo. Leigh, 246-3193.

Polytech M-14, .308 cal. 484-7335.

Approx 30" wrought iron style aluminum fencing w/gate, $150. Bill, x47311.

Sony Home stereo CD player, dual cass, surround sound, $600; cast iron wt set, 220 lbs, $100; stairmaster, $75. Eddie Pompa, x38813 or 489-7778.

Boy's bike, 16", w/new tires, $20; disc sander/buffer, Wen, $25. 488-2649.

Sears rowing machine, $50; stair climber, $305. 328-3840.

Vitamaster Pro 100, exercise stepper, foldable, ex cond, $30. 488-3238.

Voit stationary exercise bicycle w/timer/ergometer & variable pedal resistance, $80; Voit motorized exercise treadmill w/fitness computer, $125. 280-0502.

Joelle designer wedding dress, short train, white, sz 8, veil & krenelin incl; blk leather car mask for Honda CRX SI, $50. Su, x45722.

Cable TV block converter, $5. x36309.

Moving boxes, all sz; Graco Swynomatic swing, 4-position, recliner, $35; Cosco hi-chair, fold-up, swing away tray, $40; safety 1st swivel bath seat, $7; Nordic Trac 505, $375; Beautyrest waterbed w/adj cylinders, $300. Muldoon, 280-7412.

Barbie bike, 16" w/training wheels, $20; 2-child bike seats, $10/ea; Hedstrom tricycle, $10. 326-5007.

Tucumseh, 8 hp Troy built tiller, rear tines; 10 hp Troy built mulcher/shredder, both '93 models, ex cond. Fran, 333-6277 or 339-3562.

Fisher Price 3-in-1 travel tender, $45; baby float, $10; Fisher Price record player, $10; solid maple changing table, $75; matching crib w/Kolcraft 280 coil mattress, $175. Sharon, x38506 or 480-2646.

Swag hanging lamps, 2, $10 ea; electric string trimmer, $10. 488-3238.

Palaski solid oak 10 gun cabinet, 74.5"x42.75" x15.5", new $1,077 sell $700. Jerry, 971-1481.

Aquarium, 20 gal w/heat light, air pump, access, good cond, $80; Fisher Price car seat, $40. 480-3424.

Unisonic answering machine, $20; coffee maker, $10. x37130 or 334-4124.

Bike wheels, ultra lite composite, tri spoke wheels by Dupont for specialized cylinder type front & rear cass, $575 obo. 464-8694.

12 speed Columbia Sport road bike, good cond, $100; diamond/sapphire ring, $100. 474-2557.

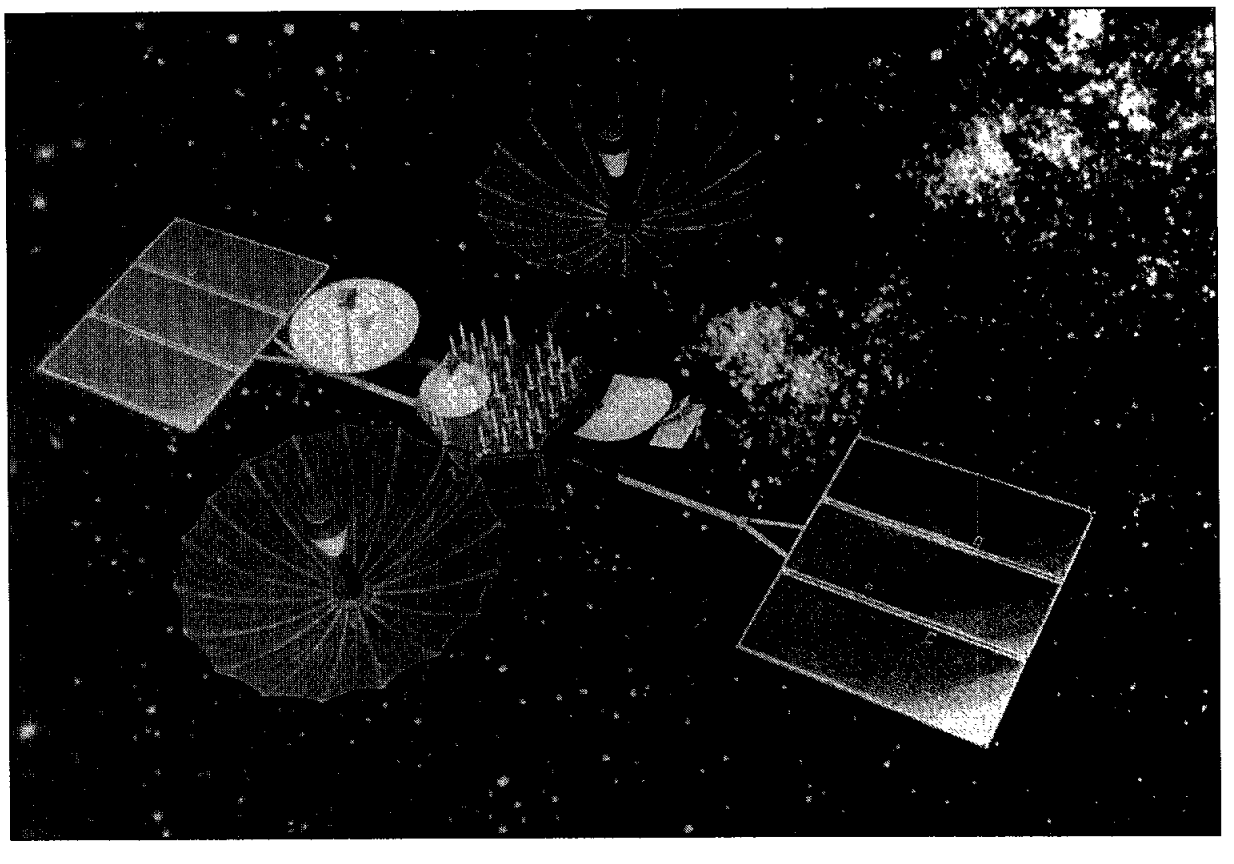
Scooter for handicapped, 3-wheel, elec, indoor/outdoor use, good cond, $650. Bob, x35013 or 280-9503.

Gymboree gift certificate can be used for 10 sessions in '95, valued at $90 sell for $50. Karen, x47616.

Viking style sword w/scabbard, $175. Gregg, x38845 or 996-8347.

Tracking Treasures

Sixth TDRS satellite, second ground terminal make system still more versatile, robust



By Eileen Hawley

Imagine space shuttle telemetry being available to ground controllers for less than 20 minutes of a 90-minute orbital period; critical spacecraft commands that can be sent only during specific bursts of time; and astronauts talking with flight controllers less than 15 percent of their time on orbit.

Sound slightly archaic and reminiscent of the earliest space flights? Think again.

As recently as the first five space shuttle flights in the 1980s, this reduced communication scenario was reality. With the launch of the first Tracking and Data Relay Satellite in April 1983, communications with orbiting humans and spacecraft was increased to about 50 percent of on-orbit time.

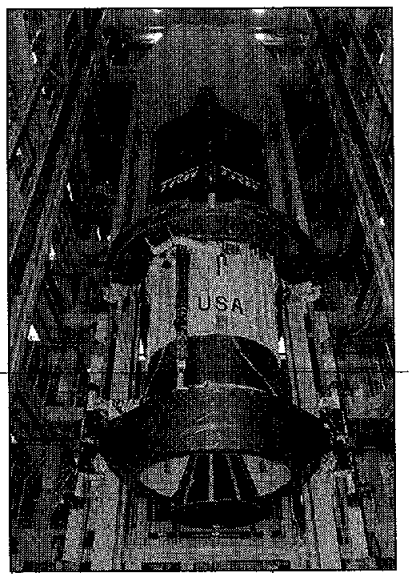
For more than 12 years the Tracking and Data Relay Satellite System, better known as TDRSS, and its individual TDRS satellites, has supported the communications requirements of a variety of spacecraft including the space shuttle, Hubble Space Telescope and Gamma Ray Observatory.

Beginning with the launch of the first TDRS during STS-6, and the coincident operations of the White Sands Ground Tracking station and NASA Ground Terminal, this space communications network has dramatically increased the flow of information between flight controllers and the spacecraft they must command.

Prior to launch, the satellites are identified by a letter—A, B, C, D and so on. Once on orbit however, the satellites are designated numerically for identification and tracking.

That first satellite, TDRS-A (or 1), was launched in April 1983. Seven months later, the STS-9 astronauts became the first shuttle crew to enjoy significantly increased contact with flight controllers on the ground. In September 1988, TDRS-C (or 3) joined its mate in orbit providing communications coverage for 85 to 90 percent of a shuttle crew's on orbit time. The launch of TDRS-D (4) on STS-29 followed in March 1989 and TDRS-E (5) on STS-43 in August 1991. TDRS-F (6) was deployed during STS-54 in January 1993. Currently, three satellites are active: East TDRS (4), West TDRS (5) and at 85 degrees east longitude, TDRS-3 an active satellite designated "Spare."

TDRS-1 will be relocated this month to be used as a support element for special activities, possibly including Antarctic communications data relay. TDRS-3, the "active spare" was moved to 85 degrees east longitude earlier this month to replace TDRS-1 which is reaching the end of its useful lifetime. TDRS-1 currently provides S-Band receive only telemetry coverage for the shuttle and Gamma Ray Observatory in the Zone of Exclusion, that area that caused the 5 to 10 percent communications outage experienced during shuttle missions. TDRS-G is set for launch in June. TDRS-B was lost in the Challenger accident.



The TDRS satellites are both immense and immensely capable communication relay systems. Weighing 2 1/2 tons with a spread of 57 feet with its solar panels extended, its six-foot dish antenna, two 16-foot parabolic antennas, and electronic beam array antennas (S/K-Band), each TDRS satellite can transfer the contents of a 20-volume encyclopedia—an average 48 million words—in one second.

The TDRS system does not process or change the information it receives. Instead, it acts as a "repeater," receiving and amplifying transmissions from the ground and then retransmitting them to the spacecraft to which they are addressed. Similarly, transmissions received from orbiting spacecraft are received, amplified and retransmitted to the White Sands Complex.

All communications between TDRS and the Earth, whether to the satellite or from the satellite, pass through the large six-foot dish antenna located near the satellite's central structure. The messages are then instantaneously retransmitted through one of two parabolic antennas or the array of 30 antenna elements dedicated to communicating with orbiting spacecraft.

Communications from TDRS are received and coordinated at the White Sands Complex in New Mexico. That complex consists of the White Sands Ground Terminal, or WSGT and the Second TDRS Ground Terminal, or STGT.

It is this intricate choreography between the TDRS—in orbit at an altitude of about 22,300 miles—and the operations of either of these two ground stations—with their three giant dish antennas, terminal system and network interfaces—that makes the complex task of communication between the Earth and orbiting satellites seem effortless and routine.

"These satellites have so much capability," said Jim Gavura, NASA station director at White Sands. "With its two steerable antennas and electronic beam forming antennas, they can track 21 separate spacecraft at any given time."

Beginning with STS-6, those complex tasks took place in the facility referred to as WSGT/NGT. Originally equipped in 1982, it was closed in March 1995 with operations shifting to the Second TDRSS Ground Terminal located three miles up the road at the White Sands Complex.

"The technology at the original WSGT was old," said Henry Allen, ground controller at Mission Control. "It had three chains of equipment and outdated hardware that tracked three TDRS satellites, East, West and Spare. We really needed to upgrade the facility equipment to state-of-the-art to support future demands on the space network."

The new facility, known as STGT, officially came on line March 10 when WSGT/NGT closed for refurbishment. The deactivation of WSGT/NGT was commemorated during STS-67 when crew members took time out to recognize the important role the facility and its operators played during 12 years of space shuttle communications support.

In addition to providing spacecraft and ground communications capability, WSGT/NGT supported the launch and deployment of five TDRS satellites. The sixth and final satellite for the current generation, designated TDRS-G, is set to be deployed shortly after STS-70 reaches orbit on June 8. Following deploy, the satellite's inertial upper stage will boost it into geosynchronous orbit. During 90 days of on-orbit checkout, TDRS-G will reside at 150 degrees west longitude before being moved to its permanent location at 171 degrees.

"When the upgraded WSGT reopens in July 1996 as WSGTU and joins STGT in supporting TDRS operations, the facilities will be able to support six simultaneous TDRS spacecraft, each with two steerable S/K-Band antennas in addition to the multi-access operations," Allen said. "That will give us two ground terminals which are alike as far as equipment, operations and interface as we prepare to support the era of the International Space Station."

"Having two sites provides a flexibility we haven't had before," Gavura said. "We've had a lot of maintenance we wanted to perform in critical areas like the power system that would have required taking the facility down. Now we will be able to do that without losing any of our support capability."

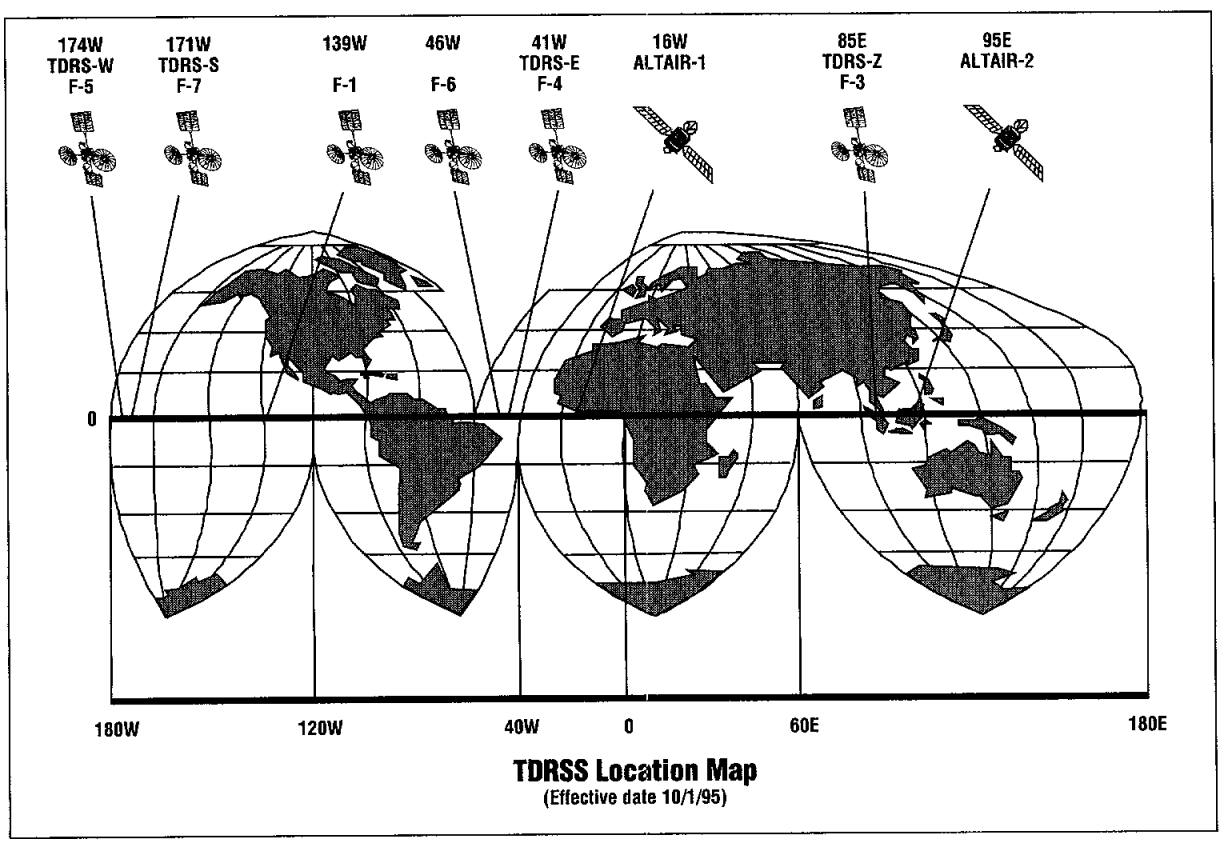
Perhaps more importantly Gavura said, the two sites ensure the ability to remain in contact with shuttle crews and other orbiting spacecraft in the event one of the sites experiences a catastrophic failure.

"Uninterrupted performance of the ground tracking station is critical to all our users," Gavura said. "Having two stations is not a matter of simple redundancy. It anticipates the future demands that will be placed on the TDRS network and allows us to make any upgrades or modifications required for the next generation of satellites without affecting our operations or customer support."

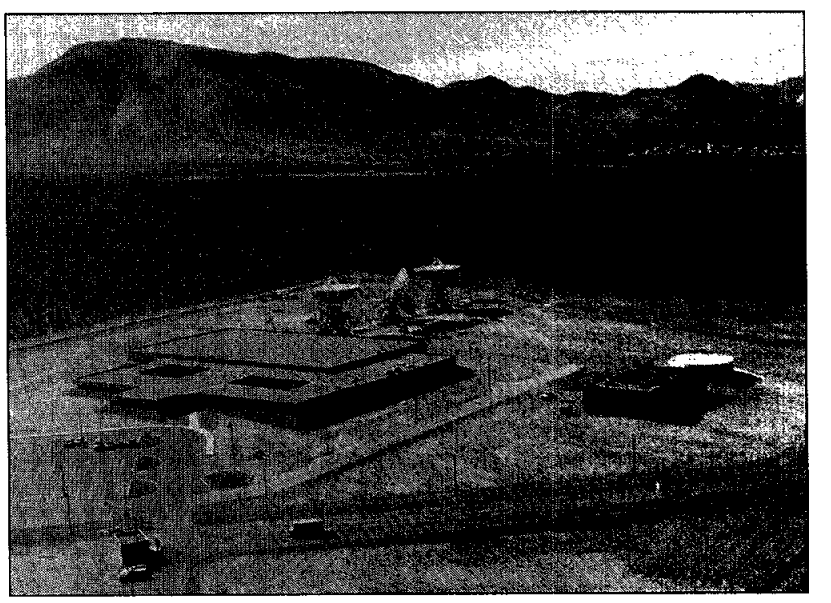
But the White Sands Complex does more than simply collect and disperse TDRS communications. It has the additional responsibility of ensuring the health and welfare of the entire TDRS system.

"We are a dual purpose site," Gavura said. "In addition to supporting customers like Gamma Ray Observatory, Hubble Space Telescope, shuttle flights and eventually space station, we also continually command the TDRS satellites themselves, monitoring the telemetry and tracking them to know their exact position in orbit."

At the White Sands Complex, work continues to monitor the health of the five TDRS currently on orbit, and the flow of information from those satellites continues to be transmitted to points throughout the world. ❑



TDRSS Location Map
(Effective date 10/1/95)



NASA Photos

Top: The Tracking and Data Relay Satellite in orbit extends to more than 50 feet end to end. Center: TDRS-G and its attached Inertial Upper Stage booster mount in the payload canister and will be loaded in *Discovery*'s payload bay on the launch pad. Bottom left: After TDRS-G reaches its orbit, all the satellites will be located as indicated on this drawing. The drawing includes two Russian Altair satellites, the counterparts of the TDRS. Bottom right: An aerial view shows the new tracking facility at White Sands.

NASA to measure northern ice-sheets for climate studies

NASA and university researchers will conduct ice mapping studies over Northeastern Canada and Greenland that they hope will yield valuable data on the potential effects of global climate change.

"The three-week campaign, which began Monday, will provide an accurate set of measurements of the ice sheets and glaciers covering two islands in Canada and various areas of Greenland," said Bill Krabill, principal investigator from Goddard Space Flight Center's Wallops Flight Facility.

This will be the fifth mission since 1991 that NASA and university researchers have conducted measurements from aircraft and on the ground to provide data on the ice sheets.

The baseline measurements help scientists better understand glacial changes that may be due to global climate change, Krabill said. Some computer models show that increased global temperatures would partially melt polar ice sheets and raise sea levels. Other models show that rising temperatures would stimulate increased precipitation that would, in turn, increase the size of the ice sheets.

It has been estimated that a 10-inch decrease in the average height of the central Greenland ice sheet would result in a 0.04-inch increase in sea level of the world's oceans.

Recent ice elevation measurements taken from instruments on NASA aircraft were compared to surface measurements taken in 1980. This comparison showed that there has been a 6-foot increase in the ice elevation on the southwest slope of Greenland near the coast. However, other areas, such as the middle of the ice sheet, are stable.

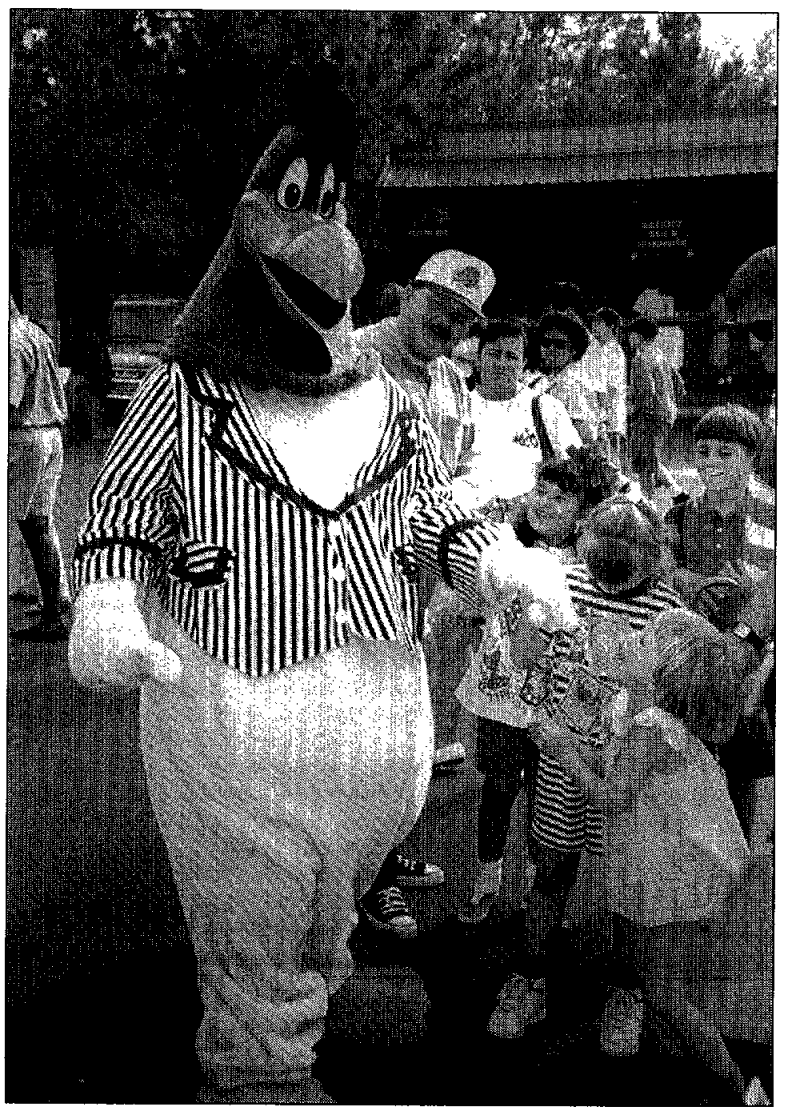
During this month's mission, researchers will fly over Greenland and Canada's Ellesmere Island and Baffin Island. Krabill said the Canadian sites were selected for mapping because minor ice caps may react more quickly to global changes than do larger ice caps.

The researchers are using instruments aboard two planes, complemented by ground observations. A P-3B Orion aircraft from Wallops is using a laser-ranging system to measure the elevations of the glacier surface. The instrument, called the Airborne Topographic Mapper, scans an area 459-feet wide immediately below the aircraft. The ATM measures the elevations of the glacial surface to within an accuracy of 4 inches, Krabill said.

Other instruments on the aircraft will include a Wallops' profiling laser system and an ice-penetrating radar to measure ice thickness.

NASA's DC-8 will fly from Ames Research Center to Greenland to take part in the mission. The DC-8 will carry 29 mission scientists, instrument operators and crew members. Its primary payload will be an airborne radar built by the Jet Propulsion Laboratory. Radar measurements will be used to determine the topography of the Greenland ice sheet, and to measure the motions of the ice.

Researchers on the ice in Greenland will conduct ground studies beneath the flight path of the aircraft to verify the airborne data.



Photos by Ginger Gibson

JSC PICNIC—More than 3,800 employees enjoy the annual JSC Picnic held at Astroworld. Left: Foghorn Leghorn greets children. Above: Several groups get together in the A&W Ranch, a special area designated for JSC, to play volleyball, feast on barbeque, play bingo and have faces painted.

New grad degree aids managers

The University of Houston-Clear Lake will initiate a new master of arts program in public and private management this fall, and it will be available to JSC employees.

"We recognize the dynamic changes being undertaken by the private sector, government and non-profit organizations," said William Staples, dean of the School of Business and Public Administration.

"The primary goal of the program is to develop students with a mastery of general management skills rather than a mastery of selected disciplines."

Key features of the new program will be extensive coverage of management skills including core management, budgeting and management control, decision support systems, human resource management, group processes in organizations and the relationship between business and government.

The new degree program will be offered for the first time beginning with the fall 1995 semester.

Employees interested in taking courses in this new master's program may submit a JSC Form 75 or contact Kazuko Hall at x45349.

NASA technology increases efficiency at new airport

Air traffic controllers at the new Denver International Airport are managing traffic more efficiently, thanks to an automation system developed at NASA's Ames Research Center.

Beginning in the late 1980s, an Ames team designed the Terminal Radar Control Automation System, which helps air traffic controllers optimize the flow of traffic into large airports.

"CTAS increases efficiency by providing better awareness of traffic flows through accurate assessment of the evolving traffic situation," said Heinz Erzberger, senior scientist for air traffic management at Ames. "It does not replace controllers, but rather 'thinks' along with them in solving traffic problems. One of its most powerful tools is a unique computer display for portraying expected build-up of delays at runways," he said.

"At the new Denver Airport, CTAS became the primary traffic management tool from the day the airport opened on Feb. 28. Components of the system are used at all three air traffic control facilities serving the airport," Erzberger said.

Denver Airport officials say the airport's air traffic management system has been operating very smoothly and efficiently since the airport began operating with CTAS. In addition to Denver's new airport, the system also is being tested at the busy Dallas/Fort Worth airport.

"We're delighted to be a research and development site for CTAS," said Paul Davied, air traffic control supervisor at Denver airport. "We have found the system to be a great asset to the traffic managers and the supervisors, as well as the controllers," he added. "CTAS enhances our ability to manage the flow of traffic in an efficient and effective manner."

The CTAS software contains a data base with the flight characteristics of most aircraft. In addition, the data base also has knowledge of winds, temperatures, arrival routes, runway configurations and landing capacity.

CTAS starts its work when traffic is about 45 minutes of flying time from the airport. As an aircraft approaches, CTAS scans its data base to select a preferred descent route based on the type of aircraft, weather conditions and various other factors. It finds the most favorable runway for the aircraft and the earliest available time for it to land.

CTAS is actually comprised of three interconnected components: a Traffic Management Advisor, a Descent Advisor and a Final Approach Spacing Tool. Only the Traffic Management Advisor has been put in operation at the Denver airport. The other two, which provide controllers with more complex information, are being prepared for testing at both airports later this year.

"NASA's primary responsibility is to develop the technology and to prove its effectiveness at the two airports," Erzberger said. "That is a tremendous challenge. In effect, to do our job, we have to create a fully safety-qualified system for these airports," he said.

Future plans call for CTAS components to be installed at major hub airports throughout the U.S. If CTAS were to be implemented nationwide, Erzberger said, the airlines would save about a billion dollars per year, mostly from reductions in delay and fuel costs.

"The Federal Aviation Administration is our primary customer for CTAS. From the beginning we have been working with the FAA and its contractors to ensure that the technology can be successfully adapted to all large airports in the U.S.," Erzberger said. "However, the complexity of the task of transferring the technology to our customer has surprised us. You have to develop a whole training infrastructure that will help the users get accustomed to the new way of thinking."

"Our work here at NASA, done cooperatively with FAA and the industry, is fostering a revolution in air traffic management," Erzberger said. "We are beginning to see the payoff in both safety and efficiency from the practical application of our design philosophy that combines the skill of the controllers and pilots with modern software and display technology."

Savings bond campaign for '95 kicks off Tuesday

The 1995 U. S. Savings Bond campaign is slated to kick off Tuesday and run through June 9.

"I'm pleased to announce the beginning of the campaign at JSC and encourage your participation in this worthwhile effort, said JSC Director Dr. Carolyn L. Huntoon. "The purchase of savings bonds is important both to the well-being of the nation's economy and to personal savings programs of individuals."

The purchase of U.S. Savings Bonds helps to reduce government financing and benefits both the buyer and seller. Interest rates are market based, climbing as market rates increase. The current six-month rate is 5.25 percent which purchasers begin earning immediately. There is no longer a minimum rate of 4 percent. The short-term interest rate is adjusted semiannually and applies to bonds for the first five years. The long-term rate applies to bonds after five years through original maturity at 17 years.

"I encourage all employees who do not now participate to consider this investment alternative," Huntoon said. "For those of you who already participate, I encourage you to consider increasing your deductions."

For information, contact the directorate coordinator or the Exchange Operations manager at x38970.

Space News Roundup

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Editor .....Kelly Humphries
Associate Editor .....Karen Schmidt

STS-71 rehearsal set for next week

(Continued from Page 1)

Atlantis' launch date is expected to firm up at its Flight Readiness Review on June 2. The shuttle is scheduled for launch no earlier than June 22. Commander "Hoot" Gibson, Pilot Charlie Precourt, Mission Specialists Ellen Baker, Greg Harbaugh and Bonnie Dunbar, Mir 19 Commander Anatoly Solovyev and Mir 19 Flight Engineer Nikolai Budarin will board *Atlantis* Thursday for a countdown demonstration test.

Work continues to ready *Endeavour* for STS-69. *Endeavour*'s five-man crew, led by Dave Walker, is in the final phase of its training for the 11-day flight to deploy and retrieve the Wake Shield Facility and the SPARTAN astronomy satellite.

Awards include finalist honors

(Continued from Page 1)

Ken Cameron, Ken Cockrell, Michael Foale, and Ellen Ochoa.

Two other programs were selected as finalists. The "NASA TV Countdown Leader," a mini-voyage through the history of space flight, is used as a countdown leader for most of the video material aired on NASA TV. It was designed by Paula Vargas, Dexter Herbert and Lora Cole. The other finalist, "ISSA Employee Brief Open," introduced an employee briefing on the International Space Station. It was produced by Ray Brown and Deidra Baker.

NASA-JSC