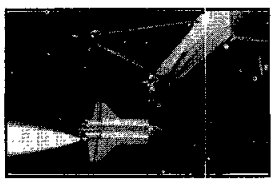
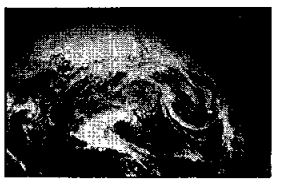
NASA
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas



Orbital ballet

Discovery will perform a veritable pas de deux with its payload during orbital maneuvers. Story on Page 3.



Hot stuff

NASA scientists believe the Earth may have been much hotter when life first appeared. Story on Page 4.

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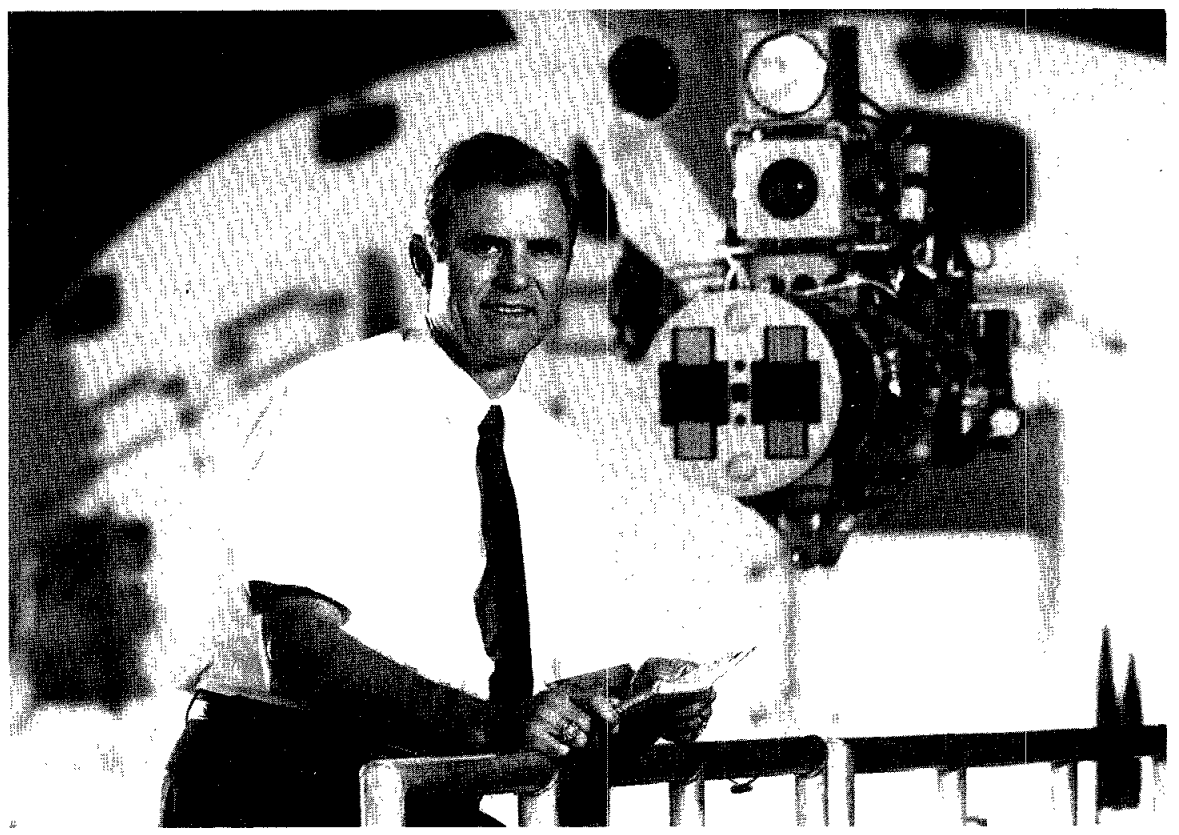


JSC Photo By Scott Wickes

Leo Monford shows off the docking alignment system that earned him the NASA 1990 Inventor of the Year title. The device, which uses a mirror and television camera for precise positioning control, is mounted on the Manipulator Development Facility robot arm in Bldg. 9A. Also on the arm is an associated invention, the Magnetic End Effector.

JSC engineer Inventor of Year

New Initiatives' Leo Monford first to bring title to JSC

By Kelly Humphries

Leo Monford, NASA's Inventor of the Year, is determined to make the space shuttle's robot arm even more useful than it is, and his inventions could revolutionize orbital docking and robotics use.

The invention that earned him the award is a "Docking Alignment System," U.S. Patent No. 4,890,918. Monford calls it the Targeting and Reflective Alignment Concept, or TRAC.

By itself, the new precision alignment system is a significant improvement. But used in concert with another of Monford's inventions, a Magnetic End Effector, it could change the shape of future robot arms, satellites and space stations.

Monford, who works in the New Initiatives Office's Space Servicing Systems Project Office, is the first JSC employee to receive the Inventor of the Year award since its inception in 1980. The award will be presented March 28 at a NASA Headquarters ceremony, according to NASA General Counsel Edward Frankle, who announced Monford's selection Feb. 5.

"My job is to come up with innovative thoughts and technologies and stimulate others into producing those products," Monford said. "I honestly can't think of an award I would desire more than this one."

TRAC utilizes a television camera mounted inside the arm's end effector and a monitor on the shuttle's aft flight deck, both with alignment marks, and a flat, mirrored target marked with cross hairs on the target object. It has been tested extensively at the manipulator development facility in Bldg. 9A and is able to routinely insert square pegs into square holes with only .03 of an inch clearance.

Here's how it works: An astronaut operating the remote manipulator system from the aft flight deck moves the arm to within range of the fixed-focus television camera inside the arm. The operator makes translational corrections with the arm until the cross hairs on the target and the monitor line up. Then, the operator uses rotational controls until the camera is able to see its own image. Since the camera can see only directly in front of itself, it will not see its own image until the end effector and the target are perpendicular to each other. When the camera can see itself and the cross hairs are lined up, alignment is complete.

"It's like looking through a rifle scope," Monford said. "Once you understand the idea of aligning the cross hairs, it just comes naturally to you."

The existing alignment system uses a target with a protruding post. The main advantage of Monford's system is that the target is flat. Many proposed space operations for the shuttle's arm or a space station arm involve stacking and unstacking objects for construction purposes.

"When you try to make things

Please see **INVENTOR**, Page 4

Discovery rolls to launch pad; crew prepares

By Kyle Herring

The Space Shuttle *Discovery* was scheduled to roll out to Launch Pad 39A at Kennedy Space Center early this morning, and the STS-39 crew will fly to the launch site Monday for the terminal countdown demonstration test.

Final work toward launch of the unclassified Department of Defense mission, the first of seven planned flights in 1991, should be complete by early March.

Discovery and the STS-39 crew — Commander Mike Coats, Pilot Blaine Hammond, and Mission Specialists Guy Bluford, Greg Harbaugh, Richard Hieb, Don McMonagle and Lacy Veach — will perform an orbital ballet, executing complicated rendezvous maneuvers with the free-flying Space Shuttle Pallet Satellite. SPAS will carry the Infrared Background Signature Survey package that is expected to provide the Strategic Defense Initiative with valuable information on how to detect rocket plumes in space.

Discovery and *Columbia* swapped places Saturday. *Discovery* was rolled to the Vehicle Assembly Bldg. and mated to its external tank/solid rocket booster stack, and *Columbia* moved to the Orbiter Processing Facility to begin work in preparation for its next flight.

With three reaction control system thrusters replaced and checked out late this week, *Discovery* was completing interface verification testing to assure all connections between the orbiter and external tank were successful and that the shuttle stack was prepared for the four-mile ride to the launch pad.

Shuttle program managers will meet Feb. 26 and 27 for the flight readiness review to assess the ability of the crew, launch control and flight control teams to support the mission. An official launch date for the eight day mission is expected at the conclusion of the meeting.

Processing work on *Atlantis* for the STS-37 mission to deploy the Gamma Ray Observatory continues to proceed smoothly with routine work in the second OPF.

Work this week included completion of checkouts of both orbital maneuvering system pods. The heat shields also were installed around the three main engines. Work remaining before transfer of *Atlantis* to the VAB includes tire pressure checks, thruster inspections and closeout of tile cavities.

Truly launches search for exploration leader

NASA Administrator Richard H. Truly this week announced a nationwide search for a senior official to direct NASA's activities to send people to the Moon and Mars.

Truly said NASA seeks "an outstanding individual, with talent and vision" for the newly created position of associate administrator for exploration. "I encourage qualified applicants from within NASA and from all sectors of our society — academia, industry and government," he added. "We need an outstanding individual to help carry out President Bush's stated goal of a long-term program of human exploration of space, as stated in the Space Exploration Initiative."

NASA's vacancy announcement, open through March 6, is for a career position in the NASA Senior Executive Service, at NASA Headquarters.

Truly's announced Dec. 18 he will implement immediately two recommendations by the Advisory Committee on the Future of the U.S. Space Program and seek ways to implement others. One recommendation was to create a new Office of Exploration under an associate administrator.

Applications should be sent to: NASA Headquarters; DP/Bonnie Acoveno; 400 Maryland Avenue, S.W.; Washington, D.C. 20546.

Black History Month focuses on education

By Kari Fluegel

Education is the focus of this year's observation of Black History Month at JSC set for 1:30 p.m. Feb. 22 in Teague Auditorium.

Black History Month has been observed in February at JSC since the early 1970s. The theme for the 1991 nationwide observance is "Education America: Historically Black Colleges and Universities."

"The Black History Committee here chose to adopt the national theme for our program because of NASA's and JSC's continuing efforts to provide funding for research and development grants, fellowships and scholarships to HBCUs in an effort to increase the numbers of black scientists and engineers graduating from these educational institutions," said Freda Marks, speaker's committee chair.

Keynote speaker for the event is Particia Russell-McCloud of Russell-McCloud and Associates. Russell-McCloud is a nationally recognized speaker on ironies and inconsistencies in public affairs. Her speech "If Not You, Who?" was entered into the Congressional Record of the United States.

Dr. Harold Martin, dean of engineering at North Carolina A&T State University, also will discuss the variety of programs available at historically black colleges and universities. he also will focus on the relevance of science and engineering programs at those institutions to NASA's space flight programs.

All employees are invited to attend, and the program is open to the public.

JSC Photo by Mark Sowa

JSC's Black History Committee gets together to plan this year's program. In the foreground, from left, are Carla Guidry, John Moore, Spurgeon Robinson, Freda Marks and Baley Davis. In the background is Lucille McGaskey.

Magellan images show geyser-like eruption evidence

Magellan scientists said Wednesday they have discovered that some volcanoes on Venus shoot ash into the sky like geysers, a far cry from the planet's typically gentle lava flows.

The Magellan spacecraft hasn't yet taken an image of a volcano erupting, but its synthetic aperture radar has found signs that the landscape in three areas is covered by ash from earlier volcanic plumes.

Those eruptions were about the same intensity of eruptions from Alaska's Redoubt Volcano or Mount Vesuvius in southern Italy, said John Guest, a geologist from University College London.

"If an eruption like this occurred on Vesuvius, you'd put a layer of ash all over Naples," said Guest, who is

Please see **MAGELLAN**, Page 4

JSC

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): $4 each.

AMC Theater (valid until May 1991): $3.75 each.

Loew's Theater (for use two weeks after movie's premiere): $4.

Rodeo Extravaganza Day (March 2-includes bus transportation, Livestock Exhibitions, Chutes Corral Club, rodeo, and Oak Ridge Boys and Gatlin Brothers concert): $15.

Thermographed, raised lettering and logo business cards can be ordered by civil service employees, 250 cards per set. Old logos-$21; new logos-$18.

JSC

Gilruth Center News

Sign up policy—All classes and athletic activities are first come, first served. To enroll, you must show badge or EAA card and pay at the Gilruth Center. Classes tend to fill up four weeks in advance. For more information, call x30301.

EAA badges—Dependents and spouses may apply for a photo I.D. 6:30-9 p.m. Monday-Friday.

Defensive driving—Course is offered from 8 a.m.-5 p.m., April 20 and May 18. Cost is $15.

Aerobic dance—Eight-week session meets 5:15-6:15 p.m. Tuesday and Thursday nights. Cost is $24.

Exercise class—Class meets 5:15-6:15 p.m. Monday and Wednesday nights. Cost is $24.

Weight safety—Required course for employees wishing to use the Gilruth weight room. The next class will be from 8-9:30 p.m. Feb. 28. Cost is $4.

Country and western dance—Intermediate class meets Monday nights for six weeks beginning March 4. Cost is $20.

Personal safety—Brief lecture on personal safety awareness. Talk begins at 5 p.m. March 13 in the Gilruth Center ballroom.

Ballroom dance—Eight-week class will feature beginner and advanced instruction from 7-8:15 p.m., and intermediate instruction from 8:15-9:30 p.m. Thursdays, beginning March 7. Cost is $60 per couple.

Softball sign-ups—Softball league sign-ups will be the week of Feb. 25. Call the Gilruth for details.

JSC

Dates & Data

Today

HSS meeting—The Houston Space Society will meet at 7:30 p.m., Feb. 15 in the University of Houston Center Underground, Pacific Room. Guillermo Trotti will speak about "Space Architecture." The presentation is free, but parking is $2. For more information call 639-4221.

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

Presidents' Day—Most JSC offices will be closed in observance of the Presidents' Day holiday.

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

HyperCard seminar—The American Institute of Aeronautics and Astronautics Software Systems Technical Committee will host "HyperCard: An Object-oriented Environment" presented by Stephen Desrosiers at 11:45 a.m. Feb. 19 at Franco's Restaurant. For more information contact Karen Lee-Taylor at 283-1961.

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

Wednesday

AIAA meets—The American Institute of Aeronautics and Astronautics will present a Ground Testing and Simulation Technical Committee lunch and learn meeting at 11:30 a.m. Feb. 20 in the Bldg. 3 cafeteria. For more information, call Dr. Sivaram Arepalli x35910.

Astronomy seminar—The JSC Astronomy Seminar will be held noon Feb. 20 in Bldg. 31, Rm. 129. For more information contact Al Jackson 333-7679.

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

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

Feb. 22

Supercomputer conference—Jon Erickson, chief scientist in JSC's Automation and Robotics Division, will be a featured speaker at a Supercomputer Leadership Conference on Feb. 22 in Houston. The conference is sponsored by the Quantitative Technology Corp. Research Institute and the Oregon Advanced Computing Institute. For more information contact Catherine Verrenti (503) 626-3081.

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

Feb. 26

BAPCO meets—The Bay Area PC Organization will meet at 7:30 p.m. Feb. 26 at the League City Bank & Trust. For more information call Earl Rubenstien, x34807, or Tom Kelly, 996-5019.

Feb. 27

Laptop showcase—The Information Systems Directorate will sponsor a notebook laptop showcase from 10 a.m-4 p.m. Feb. 27 in Bldg. 12, Rms. 112, 254 and 256. For more information call the Product Demonstration Facility at x37572.

Astronomy seminar—The JSC Astronomy seminar will be held at noon Feb. 27 in Bldg. 31, Rm. 129. For more information contact Al Jackson 333-7679.

BANN program—The Bay Area NAFE (National Association of Female Executives) Network will present a program and luncheon buffet at 11:30 a.m. Feb. 27, at the South Shore Harbour Country Club. Al Garza will discuss self-defense and give demonstrations. Cost is $10 members, $12 non-members. Program only cost is $3 members, $5 non-members. Reservations deadline is Feb. 22. For information contact Sharon Westerman, x68927, or Wanda Spain, x31025.

JSC

Swap Shop

Property

Sale/Lease: 1 BR Egret Bay Villa, on the water w/boat access to Clear Lake, pool, club house, pier, boat incl., $43K or $550/mo. Mr. Collins, 480-8190 or 996-7693.

Rent: Lake Livingston, waterfront, 3-2, C/AH, FPL, covered deck, pier, new cond., fully furn., wk/wknd. 482-1582.

Sale: LC, 3-2-2A, open floor plan, French doors, lg. deck, $62.5K assum. 332-2488.

Rent: Pasadena dulex, 3-1.5, new carpet, paint and miniblinds, 16 mi. to JSC, no pets, $400/mo. plus dep. 996-0152.

LC 3-2-3 on 3/4 acre, secluded, deck and hot tub, 5 min. to NASA. 554-7657.

Rent: Lg. Vail condo, sleeps 10, three baths, clubhouse, Mar. 16-23, 1991. (303) 484-1888.

Sale: Lake Livingston 70' x 140' lot, water, elec., Stephens Hills mid lake, west side, $1895, OBO. T. Ward, 488-5445.

Sale: Two lg. heavily wooded lots, April Sound, Conroe, golf, countryclub membership. 944-7533.

Sale: LC Countryside , 3-2-2, lg. cul-de-sac lot, covered patio, deck, spa, fans, new A/C, FP, extras, $74.9K. x35027 or 332-1410.

Sale: Friendswood, lg. 120' x 162' lot, all util. avail., $33K. Rick, 283-1988 or 996-8961.

Sale: Bay Knoll, 2599 sq. ft., 4-2.5-2, both formals, game rm., family rm. cul-de-sac, $159K. 480-5473.

Sale: Univ. Trace condo, 2-1-1cp, W/D, all appl., $36K. 286-1934.

Sale: Ellington/Sycamore Valley, 3-2-2, corner lot, lg. stor. shed, tall fen. w/wide gate, new paint, floors, $62.5K. Bill, x30164 or 481-6340.

Sale: Pecan Bend, 5+ acres, assume payments plus $1500 and closing. Wendell, x36182 or 466-3203.

Rent: Vistana Resort condo at the Epcot/Disney World entrance, Mar. 8-15, sleeps 8, $700. Phill, 283-5648.

Lease: Bayridge, 3-2-2, fenced, FPL, no pets, ref., dep. 488-1301.

Rent: Camino South, 3-2-2A, like new carpet, paint, split floor plan, formal DR, FPL, fenced backyard, trees, workbench, avail. Mar 1, $600/mo. Jan, x33434 or 333-5266.

Rent: Galveston condo, furn., sleeps 6, Seawall Blvd. and 61st St., dly/wk/wknd, cable TV. Magdi Yassa, x33479 or 486-0788.

Rent: LC 2-1 frame, lg. lot, trees, 10 ft. ceilings w/fans, no pets, $425/mo. Gene, x38020 or 334-1505.

Sale: LC Brittany Bay, 4-2.5-2, $110K w/assumable 8% loan bal. of $82K. 332-0047.

Sale: 60 acres, 3 mi. from Karnes City, TX, on Hwy 80; El Campo, TX, two-story house on 1.5 lots, pecan, fig, peach trees. 783-9164.

Sale: Bay Glen, 3-2-2, 2050 sq. ft., great rm., formal dr., study w/French doors, assumable loan, $122.5K. 480-0527.

Sale: Pearland Shadycrest Subdiv., 3/4 acre lot, all util., good schools, trees, $27.5K. 992-1913.

Sale: Pipers Meadow, 3-2.5-2, formal LR/DR, FPL, loft, wet bar, fans, gar. door opener, deck, landscaped, new paint, 15 min. to JSC, $92K. Dennis, x34405 or 480-5076.

Lease: CL Ellington condo, 2-1-, W/D. Dave, x38156 or 486-5181, or Eric, x38420.

Sale: Waterview lots near NASA, $38.5K ea. Don, x38039 or 333-1751.

Cars & Trucks

'82 GMC step-side PU, short wheel base, 6-cyl., 3-spd., very good cond., new tires, low mi., $2,995. Jerry, x34611 or 338-1393.

'84 Ford van, XLT Club Wagon, loaded, ex. cond., new tires, 74K mi., $7500. 482-1582.

'70 MGB, MG green, for project or parts, $300, OBO. Mari, x39309.

'87 Chevy Cavalier, white, 4 dr. auto, A/C, 38K mi., ex. cond., 20+ mpg city, warr., $4300, OBO. Dave, x39579 or 482-6187.

'79 Olds Delta 88, 4 dr., tinted wind., 71K mi., no rust, new brakes, ex. cond., all lifetime warr. parts, $1900, OBO. 339-1337.

'81 Chevy htchbk, navy blue, 4 cyl., 4 dr., good eng., $700. 332-7035.

'87 Toyota Celica GT liftback, white, auto., A/C, 4-spkr. AM/FM, clean, 48K mi., ex. cond., $8200 nego. 639-3455.

'73 GMC Sierra PU, good cond., 454 eng., A/C, camper, $1400. Floyd, x37467 or 486-4043.

'90 Jeep Wrangler, white w/blk soft top, 7K mi., A/C, 4-cyl, $10.2K. Julie, x35724 or 482-3134.

'78 Ford Fairmont station wagon, rebuilt eng. and trans., $850, OBO; '82 Ford Exp, 4 spd., mag wheels, AM/FM stereo, $1250, OBO. 482-5226

'83 Honda Prelude, 5 spd., sunroof, ex. cond., 87K mi., one owner, $3500. B. Craig, x32338 or 1-420-2936.

'82 Ford Anahiem custom van, P/S, P/B, tilt, cruise, AM/FM stereo, 4 caps, bed, 2 tanks, 2 A/C, make offer. 488-3191.

'84 Camero, V6, auto., A/C, 2-tone blue, 51K mi., ex. cond., $3750. x37108 or 486-8463.

'88 Ford Aerostar van, Eddie Bauer edition, loaded, 6 yr/100K extended warr., immaculate, $11,450, OBO. Mark, x36126 or 326-1192.

'78 Olds Delta, new auto. trans., 350, runs great, tires like new, $600. 489-7494.

'86 Buick Regal Ltd., V8, 2 dr, all pwr, loaded, ex. cond., 70K mi., $5200, OBO. 282-4041 or 337-2318.

'83 Ford Bronco, full sz, 4 WD, 80K mi., 6 cyl., PB/PS oversize tires, std. shift. 532-2228.

'82 Pontiac Bonneville wagon, V8, ex. cond., all pwr, cruise, AM/FM/cass., A/C, tilt, $1700, OBO. Glenn, 282-3497 or 484-4709.

'87 Toyota Celica GT, htchbk., 3-spd., auto., 48K mi., ex. cond., $8,200, OBO. 639-3455.

'78 Olds Tornado, low mi., loaded, ex. cond., $1,195. 333-5598.

'79 Cadillac, 69k mi., $1,295. Bob. x36159.

'71 Volvo 1800E, restored, new tires, x30153 or 941-6575.

'87 4.3L Astro van, auto., 81K mi., ex. cond., $5,600. Monica Wolf, 282-3406 or 370-4228.

'85 Mitsubishi, turbo, 5-spd., $3,450. 282-2810 or 334-3320.

'84 Chev. Camaro, auto., alarm, $3,650. Rogers, x38851 or 944-7042.

'86 Honda Prelude, 5-spd., sunroof, new tires/brakes, $6K. x31237 or 488-8614.

'87 reb. eng. in '85 customized '80 Ford van, has color TV, radio, CB, 4 captains chairs, sofa bed, table, bar, icebox, wtr., $4K. David, x35048 or Mary Fae, x35143 or 482-9061.

'80 Pontiac Phoenix, V6, AC, 5-dr. liftback, new auto. trans./batt., runs good, $1,950. x30092 or 481-3637.

'68 Chevelle, 6-cyl., 100K mi., $1K, OBO. Ed, 283-5716 or 333-1563.

'89 Firebird, 14K mi., 12 mo. tune-up warr., auto., ex. cond., $8,900. Carrie, x38506 or 333-4089.

'85 Lancer ES turbo, sun roof, loaded, ex. cond., $4,500, OBO. Tim, x34494 or 280-8102.

'88 Camaro, auto., V6, 50K mi., ex. cond., $6,900. Corinna, 333-9742.

'85 Pontiac Firebird, 64K mi., ex. cond., $3,600. Johnson, 480-0903.

'88 Mercury Sable LS station wagon, 47K mi., 100K warr. trans., $9,500, OBO. Terry, x36351.

'84 Buick Skylark, 4-dr., auto., AC, V6, $2,200. 482-1659.

Cycles

'80 Kawasaki KZ 1300 touring bike, 4K mi., new Dunlop tires/batt., buddy seat, ex. cond., $1,500, OBO. Bob, 485-9084.

Super Scamp go cart, 7hp Briggs, big tires, seats one, ex. cond., $600, OBO. Charles, 559-2331.

Peugeot Marseille 12-spd. bike, great cond., $100. Kyle, x38628 or 532-1072.

'84 Kawasaki GPZ 750 motorcycle, 8K mi., $2K. Shannon, x32646 or 484-5412.

Boats & Planes

Aircraft propeller-Sensenich 74DM6-0-58, fits some Beech, Piper PA-18, PA-22, PA-28 series. 538-2299.

'86 9.9 Mercury OB, low hrs., ex. cond., $600. Dave, x39313 or 996-9860.

Surfboard, 6'10" Southcoast, tri w/leash, deck pad, board bag, $200, OBO. 554-2320.

16' V-hull fish/ski, Invader, 65H Merc, trlr., $2K, OBO. 943-3305.

'79 Renegade 1540 ski boat, 140hp Evinrude, SST prop, trlr., ex. cond., $2,500, OBO. 333-6868 or 486-7846.

'87 18' Celebrity Bowrider, 165hp IO, galv. trlr., new spare, prop, cov., top, ex. cond., $7,795. 286-3626.

25hp Evinrude, elec. start, new, $1,700. Jerry Craig, 283-5311 or 420-2936.

'85 19' Bayliner, Capri, 4 cyl., 125hp, Volvo IO, closed loop cooling sys., AZ boat. 532-2228.

15' Chrysler sail boat, all rigging w/Sportsman trlr., $750, OBO. Charles, 559-2331.

'83 18' Renken sailboat, roller furling jib, 4hp aux., galv. trlr., sleeps 4, good cond., $4K. 339-3476.

Audiovisual & Computers

El Gar, model SPF 880, rating 550 VA, comp. batt. backup, ex. cond., $300. Marie, x39309.

Macintosh 512 Enhanced, 800K drive, $400. 280-8796.

Coustic auto amp., 125 watts, $70; Judo Gi, sz. 3, $20. 286-1032.

AT&T 6300, 640K, monochrome, 20MB HD, 1-360 FD, $600; Daisy Wheel printer, 40 CPS, $150. Richeson, x37005 or 488-8761.

PC SW, Xtree Gold 1.0, 5 1/4" and 3.5" disks, file viewers, text search, supports ARC, split wndws., ex. cond., $35. x30852.

IBM XT comp., 640K mem., 30 MB HD, 2 floppies, color Taxan monitor, $975; Intel 386 inboard for IBM or Compaq, 1 MWG mem., Intel warr., $375. x30092 or 481-3637.

Laptop 286 - Zenith Super Sport, 20MB HD, 720K floppy drive, 640K mem., VGA screen, serial/parallel ports, case, batt., ex. cond., $1K, OBO. Dianne, x37714 or 286-6610.

Portable Sony CD discman, plus an AC adapter, headphones, $100. David, 283-5657.

RCA console ster., AM/FM, auto. turntable/changer, 8 track player, $150, OBO. Hal, x30503 or 488-2273.

Expo 286 IBM clone, 1.2M & 1.44M floppies, EGA color, 40MB HD, 1 MEG RAM, SW, games, books, $1,250. 481-4238.

Pets & Livestock

Hand fed baby cockatiels, sweet. Linda, 484-7834.

Sm. animal carry-on kennel, meets airline specs, $10; med. 23"Lx14.5"Wx11.5"H Kennel Cab II, FAA app., $15. Shane, x35916 or 326-2344.

Free white male Peka-Poo, 8 yrs. old, neutered, outside dog. 487-0360.

Chihuahua fem., AKC, 1.5 yrs. old, blue/white, $100 cash; color 19" Zenith TV, $65 cash. Irv, x36461.

AKC Pekingese pups, born 12-9-90, 2 male red sable w/white feet, 4 point sire, champion bloodline. Sharen, x49737 or 473-6754.

Rabbits, mini lops or new Zealands. Gailo, 554-6200.

Reg. chocolate point Himalayan, male, neutered, shots, declawed, $125; reg. shaded silver Persian, fem., shots, declawed, $150; 2 dbl. yellowhead Amazon parrots, hand fed, 3 wks. old, $500/ea. Donna, 283-5453 or 337-3838.

Reg. exotic min. Vietnamese pot bellied pigs, $300-$2K/ea. and exotic doves, finches, $5/ea. James, 335-6710 or 482-6744.

Lost & Found

Lost bicycle from Mission Control Center. 332-1473.

Photographic

Polaroid cam., antique, 30 yrs. old, compl. w/flash, case, film is avail., works fine, B&W or color, $36. x33182 or 486-2622.

Household

Couch/trundle bed, new cov., heavy duty, $75. 475-9671.

DR table w/2 leaves, 8 chairs, hand carved, solid mahog., unfin., $875. x33182 or 486-2622.

Apt. sz. W/D, G.E., ex. cond., $285. x28385.

Mont. Ward gas stove, white, good cond., $60. Dena, 244-5122 or 332-6477.

King sz. 3-pc. bed set, new Cargo hdbd./foot boards, $400. 474-4663.

DR set, Italian, lighted china, Century brand, ex. cond. 333-3254.

Queen sz. wtrbd. w/sheets, $100; 8hp riding mower, needs work, $50. x38891.

G.E. side-by-side frost free 22 cu. ft. refrig./freezer, 10 yrs. old, white, $350, OBO. x32010 or 554-6743.

Recliner, comfortable, $60, OBO. 333-7345 or 474-2339.

Queen sz. matt., box spring, frame, $85; triple dresser/nightstand, $225. Marian, x59021.

Antique green full sz. bed w/mirr. dresser, chest of drwrs., 2 night stands, $750; queen sz. hide-a-bed love seat, 3 tables, $350; G.E. dishwasher w/pot scrubber, needs adj., $75. Magdi Yassa, x33479 or 486-0788.

Trad. couch, cream/blue, $150, OBO; 1.5 cu. ft., microwave, $200, OBO; 6' picnic table, $25. 333-9571.

Blk. leather Italian sofa, chair, $750; blk. Melamine modular entertainment cen., $250, ex. cond. Katie, x33185.

Modern bev. edge rect. glass top DR table w/cream marble fin., trestle base, ex. cond., $280, OBO. Katie, x33185.

Toshiba microwave oven, 1.5 cu. ft. works well, $30. 333-7010 or 482-5393.

Sofa, 5-pc. sect., 2 recliners, 1 full sz. fold-out bed, 1 corner pc., brown cloth, $700. Jerry, 283-4360 or 486-5906.

Secretary, good cond., $180; antique mantel clock, Chauncey Jerome 30 hour c. 1850's, good cond., $425. 996-1442.

Heathkit 25" color TV console w/manuals, troubleshooting kit, o-scope, VTVM, $125, OBO. Larry, 282-3161 or 996-1013.

Walnut table w/4 chairs, 2 leaves. 538-2299.

New Terra Provence 12x12 floor tile, 286 sq. ft., $4/ea.; new drwr. slide runners, 18" lg. white, $3/per drwr; used 12x18 oriental rug, $2,500; new 9'8"x13'6" light wall to wall carpet, $100. Tom, x36309 or 474-9747.

Wanted

Want used wndw. AC, prefer working, but OK if not, reas. 339-1337.

Want roommate to rent room in house, 20 min. to NASA, $270/mo. Eric, x38420 or 484-9179.

Want 400 or 800 watt P.A. pwr. amp. Jim, 333-7690 or 488-4820.

Want M/F non-smoking roommate to share 4 BR house in friendswood, $400/mo. plus nego. util. Carol, 332-9678 or 996-1233.

Want '75-'80 Ford Pinto, auto., no pwr., looks not important, does not need to run, must be towable. Trey, 280-4275 or 484-7834.

Want: Radial arm saw. 332-7035.

Want steel pipe, 2-6 in., fence post or other fencing materials. Dave, x39313 or 996-9860.

Want stroller, high performance, for jogging w/infant/toddler. Floyd, x37467 or 486-4043.

Want sm. trlr., approx. 4x8. x35724 or 333-2006.

Want male non-smoking roommate to share 3-2-2 house in LC, $250/mo. plus 1/3 util. kevin, 333-7814 or 332-1444.

Want non-smoking roommate to share 4-2 home in Friendswood, bills pd., $225/mo. Mike, x38169 or 482-8496.

Want motocross equip., boots, leathers, shoulder pads. Andy, 333-6671 or 332-9105.

Want van pool riders from Sugarland, West Wood Mall, Fondren, Loop 610 Park & Ride to JSC. Alice, x35234.

Want to start or join new mothers support group and possibly babysitting co-op. Nora, 332-4283.

Want non-smoking roommate for 4-2-2 house in Sterling Knoll, $300/mo. plus 1/2 util. Speight, x30077 or 480-2783.

Want DBX SX-30 bass enhancer, audio control phase coupled activator, KLH/Burwen or SAE transient noise eliminator. Greg, x31176 or 486-0168.

Want sm. PU truck in good cond., auto., AC, will pay up to $1K, OBO. 332-0047.

Want roof racks, Yakima or Thule for bikes and/or skiing. Shane, x35916 or 326-2344.

Want fem. non-smoking roommate to share 2-2-2 house in Pipers Meadow, $300/mo. plus 1/2 util. Tracy, x32526 or 486-3946.

Want old mech. wrist watches, any cond. x30186.

Want fem. roommate to share 3 BR home in Dickinson w/single mother of 2, non-smoker, $250/mo., util. incl. Gina, 534-2887 or 280-3991 x227.

Want roommate to share 3-2.5-2 home in Bayglen, $300/mo. plus 1/2 util. Lyndon, 282-3215 or 480-9448.

Want to buy/trade/sell baseball/football cards, I have Topps baseball cards, '73-'79 and Topps football cards, '70 and '75-'80. Phil, x32129 or 333-5113.

Miscellaneous

Rossignol Stinger skis w/Solomon bindings, 185cm, K2 poles. Eric, x38420 or 484-9179.

Ladies Obermeyer ski stretch pants, blk., sz. 12, ex. cond., $75; mens Obermeyer ski stretch pants, gray, sz. 30R, good cond., $40; 2 pr. ski poles, $5/pr. Shane, x35916 or 326-2344.

Sliding glass doors, 6'Hx8"Hx5'W/ea., good cond., top/bottom frames, $40; Wards 2 head rem. control VCR, works fine, $115, OBO. 339-1337.

Tire, WSW, steel-belted radial, new, on 5-lug steel wheel, 215/75R15, $60. Dave, x39579 or 482-6187.

4 Eagle GT tires, P20570R14, 2-3/32nds, $50; new Vetta C-100 bike speedometer, clock odometer, $35, OBO. Kelly, 282-2586.

Tanning bed, horizontal w/stand, $245. x35724 or 333-2006.

Mary Kay consultant sample cases, new, $50. x35724 or 482-3134.

Step bumper for Chev. S-10 Blazer or PU, blk., $60. Samouce, x35053 or 482-0702.

L-88 hood, fits '68-'72 Corvette, $200. 482-3033.

Silver-plated 6" Revere serv. bowl, new, $18. 486-8716.

Ski boots, Lady Caber 22, sz. 6 1/2, white, ex. cond., $25. Kurt, x34559 or 992-5031.

Memorex Universal rem. control, replaces up to 8 rem. controls, $45. 486-5734.

Singer port. sewing mach., $100, OBO. 488-5445.

13" color TV, cable ready, rem., good cond., $100; racquetball racket, Ektelon Rogue, $10. Billy, x31339.

Bowling ball/bag, $25; 2 Early Amer. stools, upholstered, $15/ea. 486-0174.

Fisher-Price car seat, ex. cond., $35. Nancy, x38522.

Sm. motorcycle, Sears, queen wtrbd., lawn mower, BO. 488-3191.

TASCAM 4-track rec., $300. Jim, 333-7690 or 488-4820.

4 blk. wire mesh rims, 14", 5-lug, used 1 mo., $200. 996-8961.

Gold nugget bracelet, 14K, 58.2 grams, $500. 482-8998.

RT airline tickets for 2 anywhere in U.S., Continental. 333-6962.

Rem. control car, RC 10, airtronics control unit, charger, 2 batt., 2 bodies, $315. Burk, 482-8330.

3 Goodyear 255/50 UR16, $35/ea.; 1 Goodyear 255/50 UR16, new, $180. Fred, x32888 or 486-9234.

Lego or Duplo building blocks, cash for Legos. 488-9080 or x3627.

25" RCA console TV, $150, OBO; gas BBQ grill, $50; Fisher Price 3-in-1 crib/playpen, $60. 333-9571.

4 Uniroyal P235/75R15 Tiger Paw Tires, good cond., $10/ea. Ted, x30621.

Computer desk w/cab., bookshelf, solid Birch, $150. 941-8751.

9mm Browning pistol, hi-pwr., case, holster, 2 cups, Pychmyer grips, $425. Matt, 333-6045 or 474-3760.

Tan pushbutton dial telephone, 6' cord; Radar detector, good cond., $75. David, 283-5657.

Browning Citori shotgun, case, ex. cond., $750. 992-1913.

Comic books, Fantastic Four and others from mid '70's, BO. Scott, x31756 or 532-1659.

2-dr. legal sz. file cab., ex. cond., $100; Engagement ring, 18K yellow gold, round diamond solitaire, .68 carats w/6 round diamonds, .18 carats, $1,200. x30874 or 333-1316.

Xerox 3703 copier, needs repair, $300. Don, x38039 or 333-1751.

Garrett PB Groundhog metal detector, ex. cond., $135; AMD 80C286-12 math co-processor for IBM 12 MHz computer, $65; Onyz chess set/wood board, $10. 481-4238.

High performance ster., $240; O'Brien water ski, ex. cond., $75; Chef-plus multi-purpose crock pot, $25; queen wtrbd. matt., $25; vacation accomm. for 6-8 at area of your choice, you pick time of yr., will exchange 11 wk. timeshare to your desire, $675. Tim, 996-9191.

4 33x12.5-15 tires on 10" rims, 2 mos. old, $600; rollbar for Toyota PU, $75. Henry, 283-6380.

Fiberglass camper top for full sz. truck, sliding glass wndws. w/screens, ex. cond., $325. Andy, 333-6671 or 332-9105.

Books on cass., used once, "The Thirty-Nine Steps" by John Buchan, "Capital Crimes" by Lawrence Sanders, "The Night of the Moonbow" by Thomas Tryon, "The Lonely, Silver Rain" by John McDonald, $7/ea. Ronnie, x32539 or 538-1649.

RCA ster. console TV, pecan, $450; Sanders mens western boots, sz. 10, $65; Kenmore floor cleaner/polisher, new, $100; Kenmore rower/exer., new, $125; end and cocktail table, $50; cocktail dress, sz. 5/6, $50. Diane, 283-5618.

13" B&W TV, $30; 19" color TV, $125; exer. bike, $30; ster., tape player needs repair, $10; baby crib w/matt., $50; 2 baby car seats, $30/ea.; baby swing, $10. Laurie, x32542.

1 sz. 235 Pathfinder radial tire, new cond., $20; compact car jack, $15; 2 40W car amps, $10/ea.; 2 40W car Pioneer spkrs., ex. cond., $15/pr.; T-gear clamp on aerobars, new, $30; Uni disc wheel cov., $10; 4 Ford wheel cov., $15/set. 286-4703.

Industrial sewing mach., Rimaldi w/new table, $800; Aprica stroller, $50; 2 baby seats for back of bikes, $10/ea.; toys and toddler stuff. Tom, x36309 or 474-9747.

Star Trek movie posters, etc.; Starlog mag., #17-118; Star Wars triology collectors mags., BO. Scott, x31756 or 532-1659.

Metal office credenza, blk. w/formica wood grain top, good cond.,; 2 hanging file drwrs., bkcs. shelves w/doors, $175, OBO. Dennis, x34405 or 480-5076.

Microwave, $80; sewing mach. cab., $150; typewriter, $90; spkrs., $35; 2 sailboards, $550/both. Diana, x33443 or 538-1040.

2 leather sided glass top coffee tables, $50/ea.; Amana Touchmatic II microwave, needs repair, BO; 2 wire wheel covers, $25/ea. James, 335-6710 or 482-6744.

18 karat, 2 caret diamond ring, solitaire diamond, over 1 carat w/Pave diamonds below, over 12 grams of gold. Barbara, 992-3861.

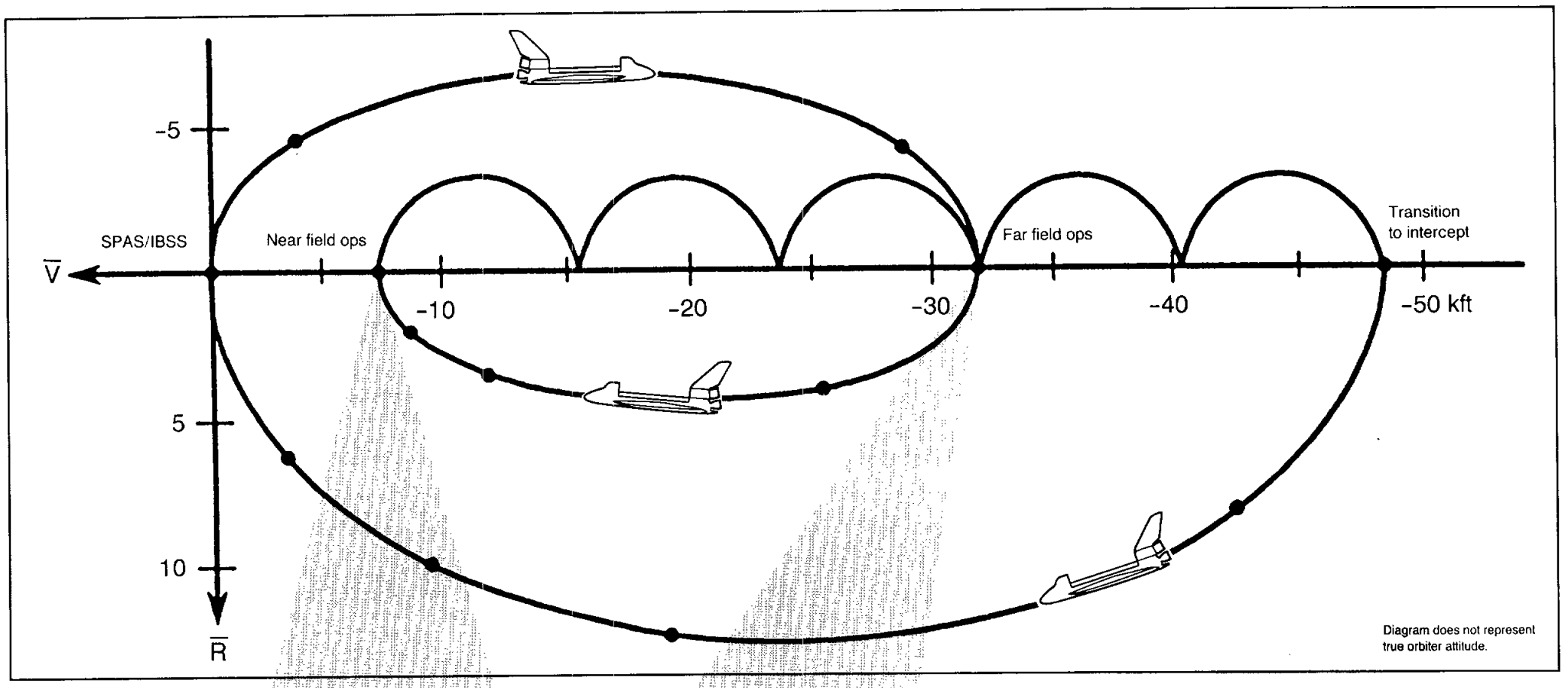
Lg. telescope, 10" f/8 Newtonian, good optics, incl. eye pcs., 60mm Finder scope, needs mount, $500, OBO. Ed, 283-5716 or 333-1563.

Genie gar. door opener, $40, OBO; oak coffee table, $55, OBO; Italian handmade blankets, green/blue, brn./tan, $30/ea., OBO; folding art easel, $18, OBO. 286-0022.

Jasper desk, 30x60 single ped w/center drwr., desk hut w/light, Hon execu. chair, $350. Lupe Salinas, 991-8473.

Office desk w/hutch, flourescent light, 3-drwrs. on side, 1 in middle, brn., office chair, 6 mos. old, $350/all. Lupe Salinas, 991-8473.

Oceanic 58/gal. aqua. w/stand, Ehiem filter, pwrhd., airpump, htr., filter, light, $300, OBO. 480-5090.



Ballet in the Sky

Orbital choreography adds complexity to *Discovery's* next flight

By Jeff Carr

Those involved have called it the most dynamic, complex shuttle mission ever attempted.

Highlighted by a virtual orbital ballet of multiple free-flying satellites across the vast test range of low-Earth orbit, STS-39 promises something old, something new and certainly something special.

The next flight of *Discovery* offers something new in the form of revolutionary sensor technologies that will be tested on orbit for the Department of Defense — technologies that could change the face of global security for decades.

To carry out the complex research mission, planners have gone to the textbooks, employing the basic principles and theories of orbital mechanics and rendezvous.

A unique aspect of the mission is its incorporation of a dynamic operating concept that will challenge astronauts and flight controllers to interact and perform in a most precise fashion to achieve their objectives.

"We've set our sights extremely high on this mission", said Lead Flight Director Ron Dittemore. "We'll utilize every operational capability of the vehicle, crew, and flight control team with the exception of EVA. Everyone is turning the gain up a notch."

The mission timeline, ambitious in itself, is packed to the limit, with crew members alternating shifts aboard *Discovery*, around the clock.

"It represents a significant amount of effort, balancing the needs of two primary payloads," Dittemore said.

Orbit Three Flight Director Rob Kelso concurred.

"We are going to be hoppin' for eight days," Kelso said.

The U.S. Air Force's fixed, pallet-borne infrared/ultraviolet observatory, AFP-675, will require precision attitude control using *Discovery* as the course pointing system. Innovative uses of the shuttle communications network will provide unique insight on the ground for DOD investigators in the Mission Control Center.

Discovery's robot arm will flex in a classic deployment and retrieval of the free-flying Shuttle Pallet Satellite, bearing the Strategic Defense Initiative Organization's sophisticated imaging platform, the Infrared Background Signature Survey.

During the dynamic rendezvous phase, *Discovery* and crew will make targets of themselves to conduct the SDIO's rocket plume research at close and long range. Maneuvering to precise distances from the free-flying high-tech imaging platform, the crew will fire one of *Discovery*'s two Orbital Maneuvering System engines up to 20 seconds for continuous plume observations.

Simultaneously, the crew will track the orbiter by maneuvering the SPAS by remote control and activating IBSS sensors from the aft flight deck of *Discovery*.

The observation burns will propel *Discovery* north, off its original groundtrack, requiring quick correction to set up the next observation and stay aligned with the SPAS for precise rendezvous maneuvers.

Following each OMS observation burn, the crew will perform a "fast-flip" yaw maneuver to turn *Discovery*'s nose around 180 degrees, setting up a braking burn in the opposite direction. Using reaction control system jets, the crew will slowly flip *Discovery* back around 180 degrees to return to its starting position behind the SPAS.

This unique series of multiple OMS and RCS maneuvers will shuttle the orbiter out of and back into position behind the SPAS a total of five times during the deployed operations. In all, nearly 60 burns are planned.

JSC's rendezvous guidance team, led by John Malarkey, developed the back-and-forth sequence now dubbed "the Malarkey Milkshake."

Adding further complexity to the orbital choreography, a third and a fourth free-flying object will be introduced when two of the three Chemical Release Observation canisters are ejected from *Discovery*'s payload bay at key times during the 36-hour rendezvous.

"We'll be tracking more objects than we've ever tracked at once," Kelso said.

As each canister carrying a different chemical commonly used in rocket propellants reaches its target distance from the SPAS, Air Force ground controllers at Vandenberg Air Force Base will instruct each to release its contents while astronauts train IBSS sensors to observe and record it.

Crew members will release the third CRO canister later in the mission while the SPAS is attached to the orbiter.

On the ground, rotating flight control teams in Houston will carefully track the objects using data from shuttle and ground-based radar systems, as they orchestrate each move and plot the next, always keeping an eye to the upcoming sequence of events.

"All team members must contribute," said Dittemore. "There are no support teams. . . . Everyone is a major player."

On board *Discovery*, the entire crew of seven astronauts will be required, at times, to work in careful harmony on the crowded flight deck, synchronizing orbiter and SPAS maneuvers and documenting key events.

Success with this complex operating plan, flight directors said, may well rely on the team's skillful response to the unexpected.

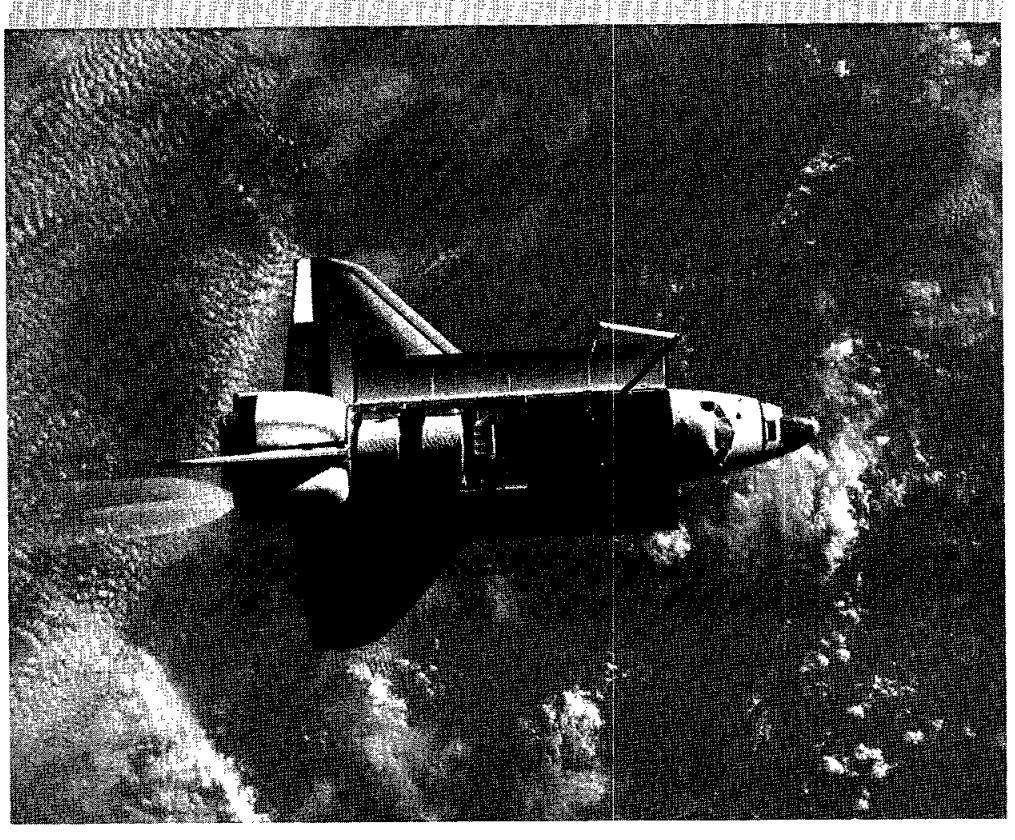
"The greater challenge won't necessarily be in keeping to the timeline as much as it will be responding effectively to unforeseen departures," Dittemore said.

Orbit One Flight Director Bob Castle compared the operation to planning a vacation.

"You know what you want to accomplish and you build your itinerary around it," he said. "But things happen, and you make the most of your time to do the things most important to you."

Flight controllers, however, are ready to meet the challenges of STS-39.

"Our objective is to test and, we hope, validate new technologies that could be important to our national defense," Dittemore said. "We look forward to the challenge."



Three times at the far field position and twice at the near field point, *Discovery* will fire one of its Orbital Maneuvering System engines — as depicted in this retouched SPAS photo from STS-7 — to allow the IBSS to record data on the engine plume.

After about 36 hours of detached operations, the STS-39 rendezvous will come to a close when *Discovery* begins maneuvers for the eventual grapple and retrieval of the SPAS/IBSS spacecraft as pictured in this STS-7 photo.

Hot early Earth evidence may change evolution theories

The early Earth may have been much hotter when life first appeared on the planet than has been believed, NASA scientists reported recently.

Evidence for a hot early Earth has been growing in recent years, and these conclusions may require major changes in theories of how life began on Earth.

Scientists at Ames Research Center believe that, during the first several hundred million years of the Earth's history, massive amounts of carbon monoxide and carbon dioxide were released into the primitive atmosphere through volcanic eruptions and the impact of meteorites and comets. Because carbon dioxide, a "greenhouse gas," traps heat radiating from the Earth's surface, temperatures soared to 190 degrees Fahrenheit.

These searing temperatures may have destroyed the large organic molecules that are the building blocks of life. In light of these conclusions, scientists are looking at sites other than the Earth's surface for places where life could have originated, said Dr. James Kasting, leader of the NASA group.

Kasting has reported his most recent findings in a paper on the role of meteor impacts on the formation of life, to be published this fall in Origins of Life. Other participants in the work at NASA's Ames Research Center include Drs. James Pollack, David Des Marais and Kevin Zahnle. Kasting, now at Pennsylvania State University, is an investigator in NASA's exobiology program managed by the Office of Space Science and Applications.

One possible location is the mid-ocean ridges, huge underwater mountain chains located about a mile beneath the surface. Massive underwater pressure at this depth could have prevented the large biological molecules from breaking down in the intense heat.

The environment postulated by the Ames group is different from theories favored by other scientists. According to Kasting, stellar evolution theory indicates that 3.9 billion years ago, a less-bright young Sun probably delivered 25 percent less heat to Earth's surface. While most scientists believe plentiful carbon dioxide maintained at least the temperatures found on Earth today, the Ames researchers believe there was far more carbon dioxide present.

Early Earth's atmosphere may have had pressures 12 times those of today and contained 80 percent carbon dioxide.

Using the first accurate measurements of the amount of gas coming out of the Earth's interior today, made by Ames' David Des Marais, Kasting speculates that the three times hotter interior of the early Earth might have spewed three times more carbon dioxide into the atmosphere.

Since the ocean-covered young planet probably lacked land mass to absorb carbon dioxide and store it as carbonate rocks, more of the gas accumulated in the atmosphere today.

Despite the high temperatures, the carbon dioxide atmosphere might have been able to protect life once it formed. The Ames scientists recently showed that a sulfur-based screen that could have blocked lethal ultraviolet radiation could have existed in the dense carbon dioxide atmosphere. The sulfur molecules would have protected organisms much as the ozone layer does today.

Another possibility advanced is that the complex molecules of life may have arrived from space, carried by incoming comets, meteorites or larger bodies.

Similar formation theories for Mars and Earth and recent Mars exploration data offer further support for the hot early Earth thesis.

'Space Basics' educational film to debut

NASA employees are invited to join JSC Director Aaron Cohen and the STS-41 crew for a Tuesday preview of a new educational film.

"Space Basics," a 20-minute film that is the first in a series called "Liftoff to Learning," will be shown at 1 p.m. in Teague Auditorium. The series is a cooperative effort under the direction of the NASA Educational Working Group.

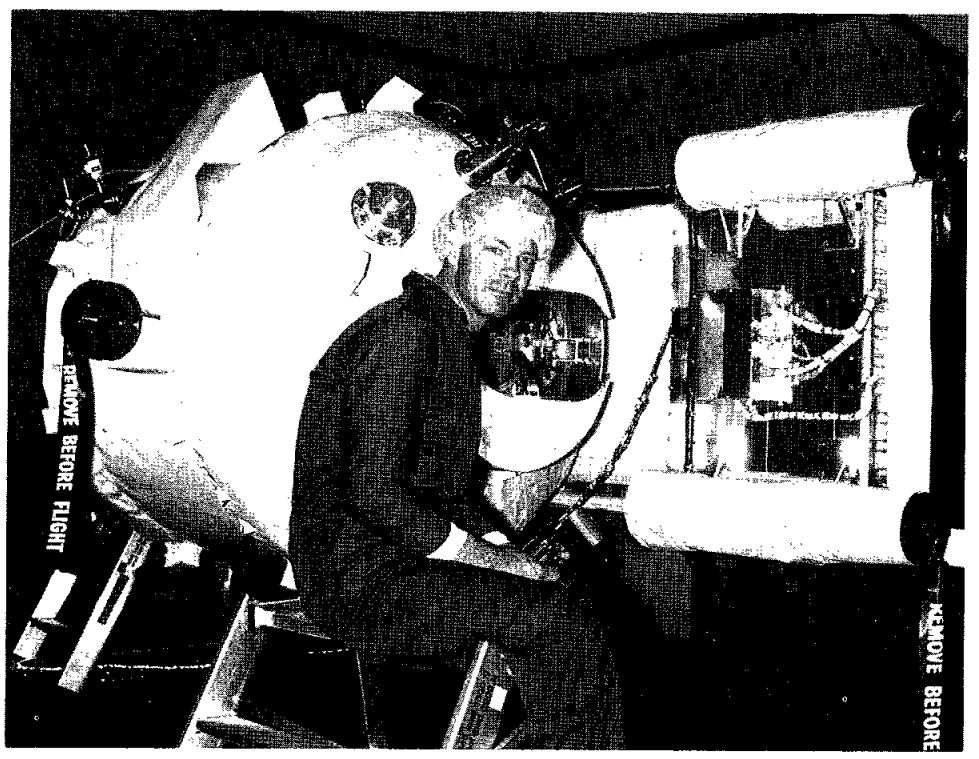
Supervisors are encouraged to allow as many employees as possible to attend so that they may learn about the new project and provide feedback. The event will be broadcast on NASA Select TV.

Colloquium features hijacking survivor

The next NASA-wide Total Quality Management colloquium will feature Uli Derickson, stewardess on the hijacked TWA Flight 847.

Derickson will discuss how "Everyone Can Make a Difference," reflecting on her 1985 experience.

The colloquium will be broadcast from NASA Headquarters on NASA Select TV at 9 a.m. Tuesday.



NASA Photo

SPAS SITTING — STS-39 Pilot Blaine Hammond inspects the Shuttle Pallet Satellite (SPAS-2) at Cape Canaveral Air Force Station in Florida. SPAS will carry the Infrared Background Signature Survey away from *Discovery* so that a series of complex rendezvous maneuvers may be attempted. During the maneuvers, the IBSS will examine Discovery's rocket plumes in a sophisticated Strategic Defense Initiative experiment. STS-39 will be Hammond's first flight.

JSC Fellowship applications due

Interested employees have until March 29 to apply for the 1991 JSC Fellowship Program which can grant them a year-long opportunity to further their education.

JSC officials strongly support academic training through a number of avenues. Under the fellowship program, the center will sponsor a select number of individuals to attend graduate school with pay for one year.

The criteria for competitive selection will include:

- applicability of the chosen area of study and its effectiveness in contributing to the achievement of JSC's mission and goals;
- statement of academic purpose from the applicant;
- prior academic coursework completed;
- written recommendation from a division-level chief; and
- the level of activity in the employee's office and the employee's own work load.

Individuals selected typically have at least three years of service at JSC which may include co-op time. Review of the candidates will be by a panel of senior managers with the final selections to be made by the center director.

While application and acceptance to the graduate school is the responsibility of the applicant, tuition and related fees, except travel, will be paid by JSC. Fellows will be required to continue their work at JSC for a period of three times the length of the training.

Interested employees should request an application from Laura Goerner at x33067. The completed application along with with recommendation of the applicant's respective division chief and directorate approval should be sent to Beth Hall in the Human Resources Office, AH3.

Desert Storm addresses

Addresses are available for several more employees of JSC and the NASA Inspector General's Office who have been called to active military duty to support Operation Desert Storm.

The mailing addresses are:

Paul Hornyak, c/o Darnell ACH (4005th USAH), Ft. Hood, TX, 76544;

Maj. Gary Priest, 11 USAF Contingency Hospital, Lackland AFB, TX, 78236-5300;

CW3 Preston Smith, Commander Ft. Hood District, 6th Region, USACIDC, P.O. Box 5176, Ft. Hood, TX, 76544-0176.; and

CW2 Lance G. Carrington, Ft. Sam Houston Field Office, 6th Region, USACIDC, Ft. Sam Houston, TX, 78234.

Conference canceled

The third annual Space: Technology, Commerce & Communications Southwest conference scheduled for March 5-7 has been canceled.

Conference organizers said budget cutbacks and the war in the Persian Gulf area reduced the number of participants expected at the Nassau Bay Hilton until they could not justify going ahead with the conference.

Correction

A story about the new Mixed Fleet Manifest in the Feb. 8 Roundup incorrectly reported that the STS-57 Atlas-2 mission would move ahead of the STS-58 TDRS-F launch.

Under the new manifest, TDRS-F will be the payload on the March 1993 STS-56 launch. STS-57 and Atlas-2 will follow STS-56 in April 1993. STS-58, which will carry the Shuttle Radiator Assembly Demonstration and Two Phase Integrated Thermal System payloads, will fly next, in May 1993.

Inventor of Year says he's an 'idea generator'

(Continued from Page 1)

stack up, a protruding target gets in the way," Monford said.

The beautiful thing about the TRAC system, he added, is that it works perfectly with the operator's hand controllers, which maneuver the arm through separate rotational and translational controls.

The first practical application of TRAC will be on STS-37, as a part of Development Test Objective 1205, "TRAC Application for RMS Alignment/Deflection Measurements." TRAC will be used to provide precise data on the amount of "play" in the remote manipulator system when a space walking astronaut applies force to the outstretched arm. The targeting system will gather data that would be difficult or impossible to gather otherwise.

Monford said researchers at Texas A&M, his alma mater, are working on automating TRAC. Instead of cross hairs, the automated system uses corner cubes on the target that reflect light back only in the direction of its origin, similar to bicycle reflectors, and a light-emitting diode on the camera lens. A computer lines up the flood-lit corner cubes to determine when the arm is perpendicular to its target. When the camera can see the reflection of the LED on its lens, the computer will know the alignment is exact.

"It's really a generic concept. It has very broad application," he said, explaining that it can provide a precise reference point for intelligent robots that need to perform exacting tasks on three-dimensional surfaces.

Put the TRAC system together with Monford's Magnetic End Effector, patent pending, and the possibilities grow.

The MEE is a potential replacement for the Standard End Effector, which grapples payloads through electro-mechanical means, using cables to snare a protruding grapple fixture. The MEE, with no moving parts, uses electro-magnetic force to "clomp onto" a plate made of ferrous metal that is attached to the payload. The metal plate shares the advantage of flatness with the alignment target, and the MEE's centerline camera would allow the docking plate to double as the target plate for the TRAC system.

Monford's smaller, lighter MEE is two-fault tolerant both in grappling and releasing payloads and requires no regularly scheduled maintenance or pyrotechnic safety release devices.

Proposed MEEs would give different sized arms the capability to grapple common target plates, add the ability to transfer both power and data to payloads and provide a method of attaching a variety of power tools that could help alleviate the need for some extravehicular activity space walks by astronauts.

"I think in the space station era, this type of an end effector will be baselined," Monford said.

The TRAC, MEE, a JPL Force Torque Sensor that provides a representation of forces and moment on the arm, and a Carrier Latch Assembly that uses electromagnetic force to help hold satellites in the payload bay, are scheduled to fly as part of the Dexterous End Effector Flight Demonstration on STS-56.

"I'm looking forward to some other exciting flight experiments that would leapfrog from this one."

Monford, who started working at JSC in 1963 as a co-op in the measurements laboratory, began working on these associated ideas when he took over as project manager for the Force Torque Sensor, a joint JSC/Jet Propulsion Laboratory project, three years ago.

"Right now, we only use the RMS to deploy and retrieve satellites," Monford said. "The thought occurred to me to try to use that arm for other things. The problem was, we needed greater dexterity."

He said he had the idea for the targeting system on the way to work from his home in Dickinson one morning. He got together with the Lockheed employees he works with — about 30 have been involved in the end effector project — when he got to work. "We demonstrated the idea that morning."

Monford had much praise for his project team, explaining that they help keep him in touch with what will work and what will not.

"I'm an idea generator," he said. "A lot of them are not good ideas. So, someone's got to say 'That's a good idea' or not."

He also credits part of his success to an extensive workshop at home, and the support of his wife, Linda, sons Leo and Michael, and daughter, Lisa. He said he frequently thinks about his projects while at home, simply because he enjoys his work.

"I used to think NASA time and my time," he said. "Now, it's all my time."

AIAA issues call for abstracts for 16th Technical Symposium

The Houston Section of the American Institute of Aeronautics and Astronautics has issued a call for papers to be presented at its 16th annual Technical Symposium

The symposium, which will be May 16 at the University of Houston-Clear Lake, revolves around the theme "Challenges of the '90s."

Suggested topics include, but are not limited to: communications, computer and energy systems; simulation; materials, structures and dynamics; guidance, navigation and control; life sciences; management; international space activities; and flight mechanics.

Abstracts of 250 words or less, typed or on floppy discs, should be submitted with a completed NASA Form FF427 to Alan Shinkman, LESC/C83, 2400 NASA Road 1, Houston, 77058, by March 22. For more information, call Shinkman at 333-7508.

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Magellan mapping

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working on the Magellan mission at NASA's Jet Propulsion Laboratory.

The Magellan images show volcanoes surrounded by cracks and faults, some of which are covered by sand-sized grains of volcanic ash, Guest said. On the leeward side of some volcanoes are areas where Venus' winds have blown the ash away.

Late Tuesday, a new command sequence shortened radar mapping passes, putting the spacecraft in the shade of its large antenna to reduce the overheating that began recently.

NASA-JSC