Space Center N/S/ Lyndon B. Johnson

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VIEWING ROOM AT MCC — Flight control managers monitor from the consoles (foreground) the activities and commands being given inside by the Flight Controllers. The TV screen in the middle

Federal Women's Program at JSC attracts unprecedented crowds

The week-long women's program last week attracted not only unprecedented numbers of JSC personnel, male and female, but also crowds of contractor personnel, visitors, and community residents. Five hundred printed programs were gone by the second day of the event, and phones were ringing off the wall, says FWP Coordinator Virginia Hughes.

One portion of the program drew particular notice from the audience: the film "What You Are Is Where You Were When," narrated by the very dynamic Dr. Morris Massey from the University of Colorado. Whether it was the rather unique title of the film which attracted so many people in the first place, or whether Dr. Massey's excellent reputation preceded him is not known. What is known is that countless people telephoned to say how much they enjoyed the film or otherwise voiced their positive feelings about it to committee members. Therefore, plans are being made to reshow the film at a

By Thursday of last week, auditorium locations had to be reshuffled to accommodate the large volume of attendance. Dr. Dale Hill attracted a large crowd with her topic of "Stress: Mental/Physical." Apparently, this is a topic of great concern to both men and women today, which probably accounts for the large turnout from both sexes.

Hill pointed out that factors leading to stress include trying to do more than one can handle and the failure to make choices concerning just how much one can handle effectively. Response to stress of this type, says Hill, can be psychosomatic, showing itself in the form of various continuous aches and pains, spastic colon, or other discomforts and illnesses. The best method, she states, to combat this outcome is to stay physically fit and exercise because these types of discomforts tend to pick just the portions of our bodies where we are most weak.

Other ways some people handle the stress is to use some form of ego defense, such as denial or ignoring of realities, or "atonement;" that is, working super-hard on some project or other to prove to oneself that he or she is really being good. None of these responses to stress

contribute much to the well-being of the individual, she pointed out, and that a better response is a positive practice of problem-oriented decision-making.

New legislation that effects women directly and indirectly at both the state and Federal levels was well covered by Ellen Mendoza, State Representative Bill Caraway, and Sally Griffiss from Senator Tower's office. Most of this legislation, it was stressed, was initiated not to take rights away from one group of citizens to give them to another, but to establish some sort of equitable policies as regards economic, social, and employment con-

Moreover, the entire women's program was marked by professionalism in the presentation of facts, studies, and statistics and not by the kind of emotionalism that some people have come to associate with topics of a controversial



Apr. 20 crowd in Bldg. 2

Skylab is reactivated by flight controllers

Early on the morning of April 24 the Skylab Activation Team at the JSC Mission Control Center (MCC) began Phase 2 of a long sequence of ground commands to reorient the Skylab.

Bill Peters, Team Leader of JSC's Flight Control Division, says that he will voice commands to the remote sites in Madrid and Bermuda, where individuals there, in turn, will send digital commands

Harry Black, JSC Instrumentation and Communications Officer, will monitor the site-received signal strength and determine if the commands were received. Commands will be received only when the solar panels are powered by sunlight.

Steve McLendon, Electrical General Instrumentation and Life Support, determined that the vehicle was rolling around its X-axis every five and one-half minutes in a clockwise direction by observing solar panel voltages during Phase 1 of the Skylab activation at Bermuda in March. The flight controllers expect that Skylab is still rolling and that all ground commands will only have a 50 percent chance of being received until the batteries are charged to carry the electrical loads while

Four of the Airlock Module (AM) batteries will be charged for a day before live telemetry will be turned on and transmitted to Houston. Once telemetry is established, the long command sequences for 15 Apollo Telescope Mount (ATM) batteries will commence. Peters pointed out that because the ATM batteries will turn themselves off if they are undervoltage, a repeating series of commands must be sent to each battery until it achieves a minimum voltage.

Peters says that in mid-May updated programs for telemetry processing and commands will be available for updating the ATM digital computer. The computer must be updated in order for the Control Moment Gyros (CMG's) to operate under new control laws. With CMG control, the Skylab will be oriented to give minimum drag in the Earth's upper atmosphere, which will give it a longer orbital lifetime.

George Guthrie, ATM Software Control Officer, will closely supervise the computer update and will verify proper receipt by reviewing memory dump data. In early June, Harry Clancy, Guidance Navigation Systems (GNS), will monitor the CMG spinup and verify proper operation of the GNS.

After these initial steps have been completed, the Flight Control Team will begin a series of attitude maneuvers to reorient the Skylab. First the vehicle will be stopped in position as it whirls past

the Sun in the rolling motion. Then, using the Sun sensors, the vehicle will be aligned precisely to face the Sun with its solar panels. Once the vehicle is properly aligned, it will be commanded to begin an Earth-orbit rate.

After this critical series of commands and sequences have been completed, the mission will settle down to a periodic monitoring and maintenance of navigation times and spacecraft systems until the Shuttle Teleoperator Retrieval System (TRS) is able to dock with the Skylab.

If Skylab is left in its present uncontrolled attitude, it would probably reenter the atmosphere by the summer of 1979. If attitude control can be regained by the flight controllers, the Skylab orbital lifetime could be extended until the summer of 1980 with plenty of time for the Shuttle and its TRS cargo to reach the Skylab.



STUDYING ENTRY DISPLAYS - Astronauts Bob Crippen and Dick Truly, prime and backup pilots for the first Orbital Flight Test (OFT-1), recently had their first opportunity to see displays of the OFT-1 entry software. The IBMdeveloped computer program will be used to guide the Shuttle vehicle from orbit to landing. The photo above shows IBM programmer Gail Johnson with Crippen and Truly as they discuss the entry display. The displays were activated for the crew in IBM's Software Development Laboratory (SDL) in Building 30. The SDL provides IBM programmers with multiple diagnostic capabilities to develop, test and debug the onboard programming in a simulated flight environment prior to its delivery to NASA and Rockwell facilities, and the spacecraft.

Shuttle main engines test fired April 21

NASA successfully accomplished an ignition test of three main engines of the Space Shuttle Orbiter Apr. 21 at the National Space and Technology Laboratory at Bay St. Louis, Mississippi. Although the test firing was not as long as planned NASA officials report that most of the test objectives were met during the brief onesecond engine firing.

The firing was to have been two and a half seconds duration; however, a low temperature reading in the fuel pressure pumps of three engines caused a premature cutoff. NASA and Rockwell International engineers will review the test data to determine if this test should be repeated before moving on to the next phase of the test program.

The Orbiter Enterprise was placed in the test stand for the start of the ground vibration tests of the Space Shuttle vehicle configuration at the Marshall Space Flight Center.



Tues., Apr. 18 panel discussion at the Gilruth Center

Taylor's dual secretarial role earns her April award for \$100

Geraldine Taylor has served as secretary to Clinton L. Taylor, Deputy Director of the Administration and Program Support Directorate, since Sept. 1975. In this capacity, she also provides backup support to the Director's secretary. She assumed the further responsibility of providing secretarial support to R. Wayne Young several months ago when he was appointed Assistant Director and the decision was made not to move his secretary with him because of limited secretarial resources.

This dual role has been a tremendous undertaking since both men are heavily involved in the myriad of activities associated with providing business management support to JSC managers and in overseeing programmatic support provided the Space Shuttle Program. In addition, they both have heavy travel schedules and extensive personal and telephone contacts with NASA Headquarters, other Centers, industry representatives, and JSC personnel so that a considerable portion of the secretary's time is spent in scheduling and rescheduling meetings to take care of the many conflicts that occur in their daily schedules and in handling the heavy telephone

Supervisors Taylor and Young both agree that their secretary is so proficient in her secretarial skills and so adept at arranging her schedule to provide the required support to each of them that she finds herself in the awkward position, for example, of having one manager wait for an important piece of correspondence while she prepares travel orders for an unexpected trip for the other.

Aside from her private secretarial role, Taylor has the responsibility of reviewing correspondence/documents, emanating within the Directorate, which are prepared for the signature of the managers in the Directorate office of the JSC Director. She ensures proper format, correct numbers of copies to a package, and grammatical correctness. The volume is high and her supervisors say she does a thorough review job without unduly delaying forwarding packages for signature.

"Taylor is an extremely dedicated and competent secretary," says her supervisor. "She enjoys her work and takes pride in being a good secretary, and this is reflected in the professional manner in which she handles all aspects of her job."



Magnuson is April Co-op student

Timothy J. Magnuson is currently working in his fourth Co-op period in the Institutional Data Systems Division (IDSD), Institutional Support Development Branch. He is a computer science major in his junior year at Lamar University in Beaumont, Texas.

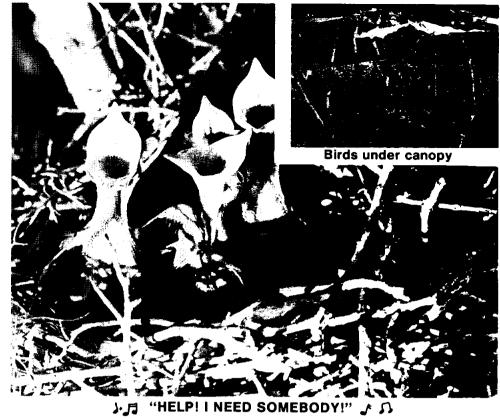
Magnuson's duties are centered around software development in the field of interactive computer graphics. He has developed several highly sophisticated software packages for the ADAGE GS340 interactive graphics system. This graphics system is a state-of-the-art mini-computer system, with a graphics micro-processor, disk subsystem, refresh CRT (Cathode Ray Tube), and several interactive devices such as a light pen, data tablet, track ball, and control dials. Although the ADAGE system is not an easy one to master, Magnuson has acquired a high level of expertise in developing efficient and effective ADAGE graphics software.

One outstanding accomplishment in this area is a generalized two-dimensional drawing package developed by Magnuson. This software program allows a user to create any desired 2-dimensional drawing on the CRT using several interactive devices, and store the coordinate data representing this drawing on the ADAGE disk mass storage. The drawing can then be retrieved from disk storage at any time, displayed on the CRT, and modified if desired. This application was used to support the Shuttle Documentation Aids (SDA) project at JSC by providing interactive generation of figures required for the Shuttle procedure planning documentation. Magnuson also gave several demonstrations and classtype lectures of this program to the JSC personnel associated with SDA.

"This software development effort was not a trivial task, and could not have been completed in the required timeframe without the initiative and technical expertise displayed by Mr. Magnuson," declares James L. Raney, Magnuson's supervisor.

Magnuson is currently in the final stages of software development of another graphics related project. This project, being developed on the UNIVAC 1110 computer system, involves software techniques to interpret graphics commands for images generated on the ADAGE graphics system and to generate corresponding microfilm plotting control commands on magnetic tape. This tape, when processed by a microfilm system, the FR80, will yield 16-mm or 35-mm microfilm plots of the same images originally produced on the ADAGE CRT. This effort is to support a requirement of the Integrated Structural Analysis System project to produce moving picture presentations of the body bendings of space vehicles during modal deformations.

"This task has also not been trivial in nature, since most of the work had to be done at the lowest logical level," says Raney. "In addition, technical knowledge of the FR80 low-level plot commands was almost non-existent at JSC. This required extensive research and self-tutoring by Magnuson. In addition, he has worked closely with his technical advisor on this project, Bernard Stuckey, to maximize his cost-effectiveness in this critical learning period."



Here's one for the (mocking) birds

The trees were thick and overgrown outside the window of the Flight Simulations Office in Bldg. 4. Dutifully, the gardeners came to sheer the trees to less gangly proportions, when suddenly they noticed a nest of newly hatched mockingbirds nestled in the foliage of one of the trees. Carefully, they replaced the whole nest — birds and all — between two sturdy branches of the now rather naked tree and hoped for the best.

But the birds were presently pretty much unprotected from the elements, and the entire Flight Simulations Office took notice of the situation and swiftly came to the aid of Mother Nature.

Arthur J. Thiberville was first to answer the little cries for help. He rushed out to cover the nest with his loosely constructed plastic canopy and hoped that Mama Bird would not abandon her nest.

Indeed, the mother appeared quite satisfied with the arrangement and, rain

or shine, continued to feed and watch her brood.

C. H. Woodling, Division Chief, cast a baleful glance in the direction of uninformed gardeners, who might inadvertently spray the little hatchlings; at well-meaning tots, who would enthusiastically dispense unwanted goodies into the little mouthes and thus scare off the birds' mother; and toward curious passersby, who were all too anxious to stick camera lenses smack in the faces of the unsuspecting little creatures.

Meanwhile, the office secretaries have kept tabs on the welfare of the unconcerned birdies and their mother and hope to see them safely off when it comes time for them to leave the nest.

Of the whole affair Thiberville sighs, "It's a wonder we get any work done around here," and he pulls another stack of papers onto his desk from his inbasket.

What's cookin' in the JSC cafeteria

WEEK OF MAY 1 - 5

MONDAY: Cream of Potato Soup; Weiners & Sauerkraut; Stuffed Pork Chops; Baked Chicken; Meat Sauce & Spaghetti (Special); French Beans, Squash, Buttered Beans. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin; Selection of Salads, Sandwiches, and Pies.

TUESDAY: Navy Bean Soup; Beef Stew; Liver w/Onions; Shrimp Creole; Smothered Steak (Special); Cabbage, Corn, Peas.

WEDNESDAY: Seafood Gumbo; Roast Beef; Baked Perch; Chicken Pan Pie; Salmon Croquette (Special); Mustard Greens, Italian Beans, Sliced Beets.

THURSDAY: Beef & Barley Soup; Beef Tacos; Diced Ham w/Lima Beans; Stuffed Cabbage (Special); Ranch Beans, Brussels Sprouts, Lima Beans.

FRIDAY: Seafood Gumbo; Fried Shrimp; Deviled Crabs; Ham Steak; Salisbury Steak (Special); Carrots, Green Beans, June Peas.

WEEK OF MAY 8 - 12

MONDAY: Cream of Chicken; Beef Burgundy over Noodles; Fried Chicken; BBQ Sausage Link; Hamburger Steak (Special); Buttered Corn, Carrots, Green Beans. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin; Selection of Salads, Sandwiches, and Pies.

TUESDAY: Beef Noodle Soup; Baked Meatloaf; Liver w/Onions; BBQ Spare Ribs; Turkey & Dressing (Special); Spanish Rice, Broccoli, Buttered Squash.

WEDNESDAY: Seafood Gumbo; Fried Perch; Tamales w/Chili; 8-oz. T-Bone Steak; Spanish Macaroni (Special); Ranch Beans, Spinach,

THURSDAY: Navy Bean Soup; Beef Pot Roast; Shrimp Chop Suey; Pork Chops; Chicken Fried Steak (Special); Carrots, Cabbage, Green Beans

FRIDAY: Seafood Gumbo; Broiled Flounder; Fried Shrimp; Baked Ham; Tuna & Noodle Casserole (Special); Corn, Turnip Greens, Stewed Tomatoes

EAA Attractions

EAA PICNIC

The EAA Picnic, Close Encounters of the Fun Kind, is just one week from tomorrow! Ticket sales end Thurs., May 4 at 4:30.

If you want to enter a division softball team in the First Annual Picnic Tournament, call L. J. Corcoran, X-6323. Let's make them fun mixed teams and avoid getting all the athletes on one team!

Tennis buffs call Jim Walker, X-2611 for the tennis tournament, and those interested in

superstar (?) competition call Ann Walker, X-4511

For those who haven't been to Camp Manison before, it is at the intersection of FM 518 and FM 528 on your left as you head west toward Alvin from Webster or League City.

Special for the kiddies: NO-NO and Fay Wynn, the Clowns.

SOFTBALL TOURNAMENT

The EAA will sponsor a softball tournament May 12 and 13. All NASA teams are eligible to participate. There are men's and women's double elimination brackets. Entry fee: EAA Teams, \$25; non-EAA Teams, \$35. Entry deadline is May 5. Forms are available from the

Gilruth Recreation Center. If the original weekend is rained out, games will be rescheduled for May 19 and 20.

Easter Egg Hunt

The children's Easter Egg Hunt was a grand success, with children galore cavorting across the recreation grounds.

Those who helped to plan and coordinate this well-attended Hunt were Glenda Lancon, Cyndi Martin, Marion Worley, Dede Worley, Frances Barbee, Rowland Cour-Palais, Brian Cour-Palais, Kristel Smith, Darla Cox, Donald Cox, and Boy Scout Troup #445.

Special Announcements

ISA OFFICERS AWARD

Joe Canniff of Lockheed Electronics Co. and Richard Spinks of Monsanto Co. were selected officers for February by Clear Lake-Galveston Section of Instrument Society of America (ISA). Joe is currently the program chairman and President-Elect and Richard is the Education Committee chairman of the Section.

Joe was honored by the Section for providing a balanced technical and educational program for the members and Richard was praised for his effort in organizing clinics and workshops for the Section. The Section has been very active in organizing educational programs for the area technical community. The various seminars, tutorials, and clinics in the technical areas of Instrumentation and Control are held in NASA-Texas City

For more information on ISA programs, Dr. Zafar Taqvi may be contacted at X-6108

ISA ADVISORY BOARD

Dr. Zafar Tagvi of Lockheed Electronics Co. has been appointed to Instrument Society of America (ISA) Technology Advisory Board for a term ending Oct. 1978. Others on the Board represent Honeywell Instruments, Boeing Aerospace, Fisher Controls, Monsanto, and

Tagvi is past Director of ISA Telemetry Division and currently holds several ISA positions.

IEEE SPEAKS OUT

The Clear Lake Subsection of Institute of the Electrical and Electronics Engineers is pleased to announce the establishment of a speakers bureau consisting of several experienced and trained members of the Society. The service is free to community civic organizations and educational institutions. The volunteers participating in the program belong to JSC and its contractors besides other technical organizations in the area.

Current list of topics include the Geosynchronous Solar Power Satellite, Computers and Space Flight, Space Photography. Space Applications, and such social subjects as the Development of an Electrical Engineer in the Society.

For further details about the program and scheduling information, interested organizations are requested to call Sharon Babb at X-3287 or write to the IEEE Speakers Bureau, c/o Sharon Babb, NASA, JSC, EJ4, Houston, Texas 77058.

IEEE/ISA JOINT MEETING

The Institute of Electrical and Electronics Engineers (IEEE) and the Instrument Society of America (ISA) are sponsoring a joint technical meeting May 18 at the Gilruth Center at 11:30 a.m. Mike Zuteck of TRW Systems will speak on the topic "Wind Energy — Is It Viable?" The luncheon is \$2.50 and the program at noon is free. Luncheon reservations are required, so call Al Roelse or Billie Heiden, X-4119 before May 16 if you plan to attend.

SPECIAL PUBLICATIONS

The NASA Special Publications listed below are available to JSC personnel who have an interest in the subject matter.

NASA SP-290	Turbine Design and Application. Volume III.
NASA SP-369	Forced Flow Once-Through Boilers
NASA SP-371	Large Scale Dynamic Systems
NASA SP-372	The NASA!University Conference on Aeronautics

Free Radical OH: A Molecule of NASA SP-373 Astrophysical and Aeronomic Interest

The Atmosphere of Venus

NASA SP-384 Significant Accomplishments in Science and Technology, 1974

Proceedings of the 1958 Flight NASA SP-385 Flutter Testing Symposium NASA SP-4009, The Apollo Spacecraft: A

Chronology NASA SP-5103 Selected Technology for the Gas Industry

Requests for these documents can be made by submitting a completed JSC Form 614 to JM86, Distribution Operations. The JSC Form 614 must be approved at the branch level or above.

NEW DISCRIMINATION REGULATIONS

New regulations concerning the processing of discrimination complaints based on physical or mental handicap became effective Apr. 10. So look for this information in upcoming EEO and Personnel publications or call X-4831 for details.

AHA CYCLETHON

The Clear Lake Unit of the American Heart Association May 13th Cyclethon is looking for people with pedal power.

Bob Benbow, chairman, is initiating a new community concept of local company cooperation and competition of adult cycling teams. The company team (JSC, contractor, or other) which secures the largest number of monetary pledges will win an outstanding trophy. In addition, there will be other exciting prizes ranging from gift certificates to 10-speed bicycles for the elementary, junior high, high school and adult individual divisions.

On Saturday, May 13, 7 a.m. - 5p.m., a course will be open for elementary riders on an unlimited 2-mile closed course in Clear Lake Forest and for adult riders on an unlimited 10-mile closed course beginning at the fire station on Kirby.

Entry forms for the Cyclethon are available at grocery stores, bicycle shops, schools and banks.

Call Bob Benbow at 474-3512 if you would like any additional information on the \$14,000-goal Cyclethon.

DUPLICATE & PARTY BRIDGE

Come and play duplicate and party bridge at the Gilruth Recreation Center for fun, cash prizes, and refreshments. Tickets are available from the Exchange Store, and the event is sponsored by the Houston Area Federal Business Asocia-

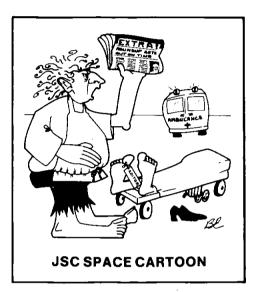
CLASSES

INTERMEDIATE AUTO MECHAN-

ICS - Another session of this successful class will be held Thurs, nights starting May 4. This course is designed as a supplement to the "back vard" mechanics skill basics. The fundamentals of performing minor tune-ups, carburetor overhauls, and light repair (brakes, shock absorbers, hoses, belts, etc.) work are covered in lecture and lab sessions. One lab will be a two-hour session and the other a four-hour session, both held on Saturdays. Students will actually perform minor tune-ups and install carburetor repair kits. Potential benefits to students include significant monetary savings plus the satisfaction of knowing their car is repaired correctly. Four two-hour lectures and two labs are \$33.50/person. Sign-up deadline is May 2.

SUMMER OIL PAINTING CLASS —

June 15; six weeks length; price \$37.50, Maximum 15 students Payment and enrollment must be made no later than June 12. Contact Gilruth Center, Tim Kincaid, X-3594, Ted Mac-Donald, X-4921, or instructor, Lois Miller, X-3216, (FD4). Class will meet on Thursday night each week, 6-8 p.m., room 209, Gilruth Recreation Center.



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Editor: Beverly Eakman - 30 -Photographer: A. "Pat" Patnesky

Swap Shop advertising is open to JSC federal and on-site contractor employees. Goods or serv-

ices must be offered as advertised, without regard to race, religion, sex or national origin. Noncommercial personal ads should be about 20 words and include home phone number. Typed or

Roundup Swap Shop

NASA SP-382

PROPERTY & RENTALS

Sale: Have an airplane? Buy a HOUSE in Friendswood w/ an airstrip adjacent to the back yard! An airman's dream on 1/2 acre.

Sale: Lg wooded corner lot in Big Thicket area. Access to fishing lake. Leach, X-3584 or

Sale: Beautiful Mediterranean home w/ parquet floor, circle drive, sunken den, trees in quiet neighborhood. Secluded. Shoreacres. 3-2-2. \$58,000, VA; FHA. Rudy, 471-4071 after

Sale: Trinity River, N. Lake Livingston, wooded lot; 2-bdrm, 50 x 12 mobile. Only 100 yds from launch, basin, clubhouse. \$8,500.

Sale: Must sell Hilltop Lakes lot: below market value. Yawn, X-5191 or 482-0044 after

Rent: Lakeside vacation retreat at Cape Royale on Lake Livingston. New 3-bdrm waterfront home complifurn. Facil inc tennis. pool, golf, boat launch. Rent by wk or mo. 488-3746.

Rent: Lake Livingston, Cape Royale, compl furn home, 3-2-1. Fishing, hunting, tennis, golf, etc. Reserve early. Wk/mo/yr rates. 488-4487.

Rent: Galveston West End. 2 BR by-the-sea condo apt. full furn. \$180/wk off-season; \$260/wk in-season. Clements, 474-2622.

Rent: New Galveston Island jamaica Beach cottage. \$175/wk or \$30/day for weekends. 334-1640 after 6 p.m.

Sale by owner: House in Heritage Park, Span, 3-2-2, custom drapes, 8 mo old. XInt investment or first home. Low equity, assumption or new loan. Brad, X-5217 or 332-1055 after 6.

CARS & TRUCKS

76 El Dorado Cadillac. Fully equipped, xInt cond, 28K mi. \$8,000. Hanovice, X-4464 or 649-2191 or 783-0091.

69 Buick La Sabre. A/C, 4-dr, pwr steer & brakes, xInt cond. \$700. 333-2368.

70 Plymouth Duster. A/C, auto, 2-sr, 6-cly, one owner. \$4950 or make offer. 729-9388

76 Monte Carlo. Maroon leather inside/outside, bodyside, moldings, hideaway, CB, antenna, very clean, 23K mi. \$4,000. 479-8364 after 5

71 Dodge Challenger. Auto, 318, A/C, pwr steer & brakes, AM radio, bucket seats, console, vinyl top, good tires, 46K mi, xlnt cond. \$1,500. Dyer, X-2983 or 488-5259.

68 T-Bird. Cruise control, tape deck, xInt ind, appreciates ea vr. \$1,895 w/out trade on late Celica, etc. Michael, X-5143 or 333-2468

66 Chevelle SS. White, Hurst shift, headers, tape deck, xint accell, good cond. Must sell. \$850. Harlan, X-2566.

77 Dodge Van. Trandsman 200 Custom, pwr steer & brakes, A/C, auto, 2100 mi. \$6,700.

Dial, X-2564 or 488-1403 after 5. 59 Mercedes, diesel. \$2,250. 471-5396.

68 Chevy Impala. Good motor, 4-dr, new battery, good tires, needs a little mechanical work. \$125. 734-2565.

BOATS & PLANES

67 Cobia 17' Trihull w/ '67 60-HP Johnson motor (needs work) & trailer), &500, Johnson, X-6353 or 481-1441

American Eaglet powered Sailplane. Wing kit, tail kit, landing gear kit, completed enclosed trailer, & more. \$1,200. Carver, X-2109 or 334-1619.

CYCLES

73 Honda CB 175. Adult owner, new battery. luggage rack, windshield, 2 helmets, 2500 mi. \$425. Dyer, X-2983 or 488-5259.

77 Honda XL250. Street & dirt bike, xInt cond, 4700 mi. \$650. Steve, 332-4865.

73 yamaha 650. Extras, 15K mi. \$675. Cundieff, X-2531 or 334-2305.

printed ad copy must be received by AP3/Roundup by Wednesday of the week prior to publication.

Three beautiful, never used, perfectly matched Mex marble slabs to make your own 60" x 20" coffee table. Also two 21 x 21 accent tables. \$160 or best offer. Garcia, 333-2916.

HOUSEHOLD ARTICLES

G.E. dishwasher motor model SC600C1. Fits convertibles 6 - 10 yrs old. XInt cond. \$10.

Magnavox 21" B&W TV. \$25. Also, Sears 20" self-propelled mower. \$25. Both in working cond & about 9 yrs old. 488-4069.

Air conditioner. Window unit Friedrich; 19,000 BTU, 220 volts, good cond. \$100. 472-4003

Gold shag carpet. Approx. 100 sq. yd. w/ pad. Good cond, shows little wear. \$150.

Grissom X-3431 or 488-0541 Gold club chair, \$25. Dark thick pine break-

fast table, \$45, 488-8678. Twin beds w/ mattress. Also boy's dresser

w/ mirror, walnut, good cond. 482-7669.

STEREOS & CAMERAS

Sears camera/telescope tripod. \$10. Lake, X-5271 or 523-2137.

Tobisha w/ 2 speakers, turntable, box. Brand new. \$350. Evelyn, X-3445.

WANTED

Used jack f/ Corvette (screw type) & used scuba tanks. Suler, 941-1929 any time.

Firefighters needed! Men and women adult residents of CLC needed to join CLC Volunteer Fire Dept. Rewarding community service. You will be trained and equipped. Call 488-0023

Need new members f/ Bacliff Bass Club Singles-couples welcome. Meetings, tournaments, prizes. Parker, X-4241 or Mobley, X-4428.

MISCELLANEOUS

Fiberglas 8' slide-in camper. Good shape. \$50 or best donation to the Boy Scouts, Bryant, X-3981 or 479-5089.

One set headers. Fits 340 Dodge engine. \$40. Crain, X-6421 or 946-4455.

Mag wheels & wide tires. Five-spoke mags w/ chrome rims & lug nuts, 14". Fit 5-Lug Chevy. Inc 4 wide tires, 2 F60X14; 2 D70X14. All f/ \$50. Also headers f/ small block Chevy. Made by Thrush, inc one Thrush muffler, very litle use. \$25. 554-6685.

Lawn mower: 31/2 HP w/ grass catcher, good cond. \$35. Moore, X-2982 or 488-4089. Surfboard, Rainbow Rider, 6

super-tube leash. Good cond, \$60. 474-3489. Trailer hitch, Class II f/ 1965-1972 Ford,

Chevy, Mercury, & Pontiac. \$20. Mansfield, X-6101 or 944-5473.

Heavy duty pickup camper equipment: 90" x 10" bumper, \$35; Ride-Rite air suspension, \$50; stake tie-downs, \$20; 20' sewage hose & fittings, \$10. McCreary, X-4688 or 488-7636.

Gas lawnmower & grass catcher. \$15 Cundieff, X-2531 or 334-2305.

Late model Magic Chef built-in dishwasher. Top-of-the-line, needs new motor only. \$15 if you will pick it up. 488-7232. VW trailer hitch. Fits 50-73 Beetle or 50-71

Ghia. Attaches to frame & bumper. Cost \$31. Will sell f/ \$20. Almost new. 482-7529.

Auxiliary OMC 6-gal gas tank w/ hose fittings f/ boat engine. \$20. Bliss, X-2491.

Wheel, 15", f/ 1972-78 Dodge van. Like new. \$15. Also, 14" wheel & F-78-14 tire f/ Dodge Duster, \$10. 488-8678.

PETS

Bay mare, 7-1/2 yrs old, 14.5 hands, good w/ children. \$425. Eggleston, 482-4239.

FREE: rare Burmese cat. Short, sable bwn coat, male, 2 yrs old, neutered, lovable, housebroken. Cools, X-5886 or 488-3896.

LOST & FOUND

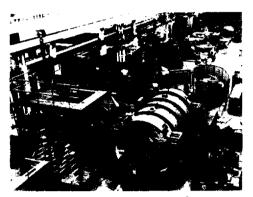
Lost: Softball glove Diamond no. 3 (in stands) nite of Apr. 3. Richards, X-3541.

TSD maintains diversity, high-quality craftsmanship

The Technical Services Division (TSD) is thought of by many people around the Center as JSC's "workshop." Actually, the TSD function is far more complex and diversified than the term workshop implies.

The TSD provides the manufacturing capability for the Center and, as such, must be staffed and equipped to accommodate virtually any programmatic fabrication requirement. And that's a tall order! The result of this demand has been to collect the most qualified group of craftsmen available representing roughly 27 areas of manufacturing expertise.

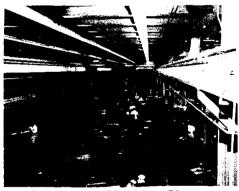
The three main branches of the TSD perform essentially all the work and serve to categorize the varied tasks: the Machine Branch, the Sheetmetal and Model Branch, and the Electromechanical



Sheetmetal and Welding Section



Heavy Machine Shop



Instrument Machine Shop

Branch. From these three branches, JSC maintains a diversified shop complex having the capacity to fabricate precision components and assemblies ranging from subminiature to large structures necessary in the research and develop-

Just a few of the TSD functions are machining, sheetmetal fabrication, model building, electronic/electrical fabrication, precision grinding, patternmaking, sculpturing, optical tooling, plastics fabrication, printed circuit fabrication, numerical control machining, electromechanical assembly including battery servicing, engraving, and marking. A complete description or list of all the TSD capabilities would be exhaustive, and the list of job assignments runs the gamut from fabrication of a rat experiment cage to circuit configuration for a guidance and navigation test station console.

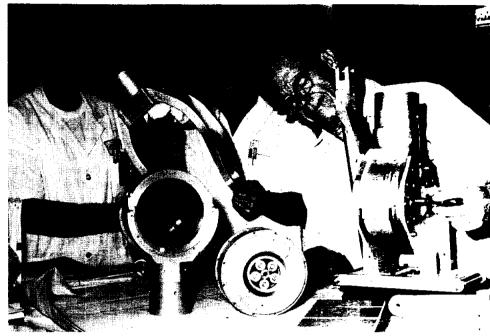
J. D. Williams, Chief of Technical Services Division, says: "It is the vast variety of tasks we are called upon to do on a day-to-day basis that makes our job so interesting. We have a saying, "If you don't like what you are doing today, just wait until tomorrow." It is probably the diversity of our work more than any other factor that keeps our technicians highly motivated. In addition, it is a challenge to stay abreast of state-of-the-art manufacturing techniques, and at the same time we stay

current with the ongoing programs and activities here at JSC."

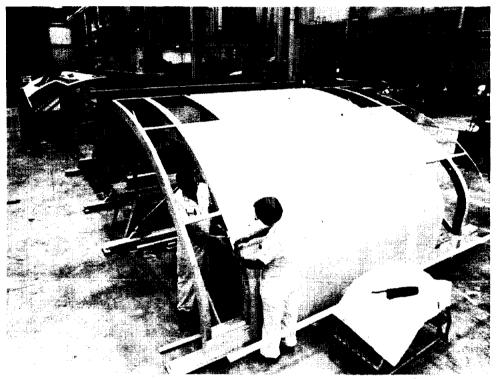
The Sheetmetal and Model Branch supports Centerwide research and development activity with light and structural sheetmetal and welding fabrication. The Branch also provides manufacturing support in wood, plastics, and composite materials and fabricates full and reduced scale models and mockups for training, testing, and mission simulations.

Two examples of recent models and mockups that the TSD has performed fabrication for are the "One-G Mockup Facility" and the "Manipulator Development Facility (MDF)." These are part of the Building 9A Mockup and Integration Laboratory (MAIL), which consists of five separate Shuttle-related facilities, two of which are the Engineering and Development mockup facility commonly identified as the one-G mockup and the MDF.

The one-G is a full scale, high-fidelity Orbiter mockup used for engineering studies, procedure and design reviews,



PRELIMINARY ASSEMBLY OF THE PIDA - Shown left to right are Rudy Marent, Murray Norman, and Louis Normand, who are some of the technicians involved in assembling the rotary actuator and lower actuator clamp assembly



PAYLOAD BAY DOORS MOCKUP FABRICATION — In the foreground are shown (left to right) John Heckler and Jon Fisher constructing a 15-foot high-fidelity section of the payload bay doors, while J. D. Higginbottom (in the background) applies the outer skin to the 30-foot low-fidelity doors.

payload accommodations, and experiment interface studies. Currently, TSD is fabricating payload bay doors for the one-G mockup and for the Manipulator Development Facility. The MDF provides a realistic simulation of the Orbiter remote manipulator system for the development of payload operational procedures and

quired on the NASA T-38 aircraft to decrease the lift/drag ratio, permitting the T-38 to be used as a Shuttle chase plane and intermediate trainer. Through an earlier request, TSD has fabricated prototype speed brake assemblies that proved highly successful.

Since the manufacturing of the first



FIT CHECK OF T-38 SPEED BRAKE - A few of the technicians involved in performing a fit check of the first speed brake assembly are (left to right) Leon Atkins, Ron Jackson, and Dick House. They are using an actual portion of the T-38 fuselage.

hardware. This requirement came from the Spacecraft Design Division and completion is scheduled for November 1.

A unique job involving the Heavy Machine Section of the Machine Branch is the fabrication of a number of sets of speed brake assemblies for the Aircraft Operations Division. Speed brakes are reprototype assemblies was accomplished on the numerical controlled milling machine and stored on magnetic tape, subsequent assemblies are being manufactured at a significant cost savings.

Another unusual and interesting requirement from the Spacecraft Design

Division has been the fabrication of components by the Instrument Machine Section of the Machine Branch for the Shuttle Payload Installation and Deployment Aid (PIDA). The PIDA consists of the electromechanical actuator assembly, an arm assembly, and a docking mechanism assembly. The PIDA will be used in the MAIL described earlier, and it uses a fourbar linkage mechanism with a single point application of rotary power to move the payload from the bay with a circular arc motion to stay within the specified clearance envelope and displace the payload from the spacecraft to a position that permits deployment or retrieval handling of the payload by the remote manipulator.

Historically, the TSD goes back a long way in the space program - back to 1959 and the "Little Joe" capsule fabrication in the NASA/Langley shops, back to 1960 when it was expanded to include technical support to the Astronaut Corps in training and preparation for manned launches, back to 1962 when the TSD moved to Houston from its Virginia location.

In 1962, The TSD fabricated a working model of an advanced Apollo simulator and provided soft-landing test support; they produced a high-fidelity trainer for flight crews — a full-scale Gemini — and an earlier concept of the lunar excursion module. Then, in just two short years, they found themselves involved in such complex and science-fiction-sounding schemes as a Mars mission module, involving fabrication of various shaped eliptical cones for wind tunnel testing as part of the Advanced Spacecraft Technology Program.

From there they went on to fabricate EVA units for the astronauts, a scale model of chamber "A," and the multitude of lunar hand tools. As the space program advanced the state of the art associated with electronics packaging, the TSD updated its facilities to include the latest in printed circuit manufacture.

Indeed it can be said that the TSD has been an integral part of every mission and even some nonmission-related work, including some of the components used in the mobile biological isolation garment that became little David's suit (see the November 25 Roundup).

J. D. Williams became division chief on January 1, taking over from his longtime predecessor, Jack Kinzler. William S. Lee has been deputy division chief about six months.

Who knows what the future will bring for the TSD. Maybe some of the individuals there even now will be able to build structural beams in outer space, and perhaps their children will help construct the first space colony or city.

Science fiction? So were Skylab and Venus probes once!