ROUNDUP

Lyndon B. Johnson Space Center

NASA

October 27, 1978 Houston, Texas Vol. 17, No. 21

Photo courtesy of Thiokol Corp.

SRB motor fires like a master

The third static test firing of the Shuttle's Solid Rocket Booster motor took place Oct. 19, in the Utah desert, exercising the motor's aft mounted system for "steering" or controlling the booster's direction of thrust.

During the test firing, the thrust vector control system was commanded to gimbal, or swivel, the motor exhaust nozzle, a command that varies the direction of the rocket exhaust thus helping to "steer" the Shuttle in its flight toward Earth orbit.

The test ran the full two-minute duration the motor operates during actual launch.

The thrust vector control system tested was the flight version using hydraulically actuated servoactuators to provide nozzle movement as commanded. Marshall Space Flight Center tested and assembled the system before transporting it to Utah for the test.

Each motor weighs 1,252,419 pounds (568,097 kilograms) fueled and produces 2.75 million pounds (12,232,550 newtons) of thrust. The electrical system, the systems to recover, and the motor make up the Solid Rocket Booster, two of which will be used on each Shuttle mission.

In two previous tests, the motor also performed successfully. The tests take place near Promentory Point, Utah, by the Thiokol Corporation's Wasatch Division, prime contractor for development of the motor.

During a Shuttle launch, the motors are jettisoned on burnout at an altitude of about 27 miles (43.5 kilometers). A parachute recovery system lowers them into the ocean where they are recovered and reused.

Skylab controllers' hours "normal"

He overcomes an obstacle, toils through an impediment

Going to a 24 hour-a-day Skylab operation means flight controllers can work more normal hours, though that may seem contradictory.

Before the Santiago, Chile, tracking station came on line Oct. 15, flight controllers at Building 30 worked 9 1/2- to 11-hour shifts, six to seven days a week. There were two teams working the 18 hours a day Skylab was in acquisition.

Now with 24-hour-a-day acquisition, the Skylab flight control staff was built up to five teams, each working 8-hour shifts.

The strain of long hours and extended work-weeks the past summer was evident on a blackboard in the Skylab control room. "Exercises in Futility," it read, then listed: "Unmasking the Lone Ranger, requesting annual leave, scheduling the shuttle, playing football against Oklahoma, and making a good dink out of a team leader,"among other things, some unprintable here.

Light humor balances the tension of flight controllers' shifts, where every 90 minutes they become intense in front of video screens. Headphones linking them to Goddard, Marshall, and the tracking stations, they keep a constant check on Skylab's power supply and orbital status.

"We're unhappy if things get off one degree," says controller Dusty Samouce.

With the 24 hour-a-day operation, controllers now work seven days straight on 8-hour shifts, with one or two days off. They work that pattern three times, then take ten days off. "It comes down to a 40-hour week," said team leader Leo Reitan.

Frank Casey is an engineer in the Systems Design Office. He analyzes the effects of radiation on solar cells in space. He uses an abacus for calculation, he walks with a cane.

Frank Casey is going blind. But he is still at his desk every weekday morning, doing the work he has done for over 30 years.

He has retinitis pigmentosa, an incurable disease that progresses to blindness. At age 44, he's completely blind in his left eye and has little vision in his right.

Working with the Texas Commission for the Blind and the space center's EEO rehabilitation program, Casey has worked out a program where "with the various tools, I'll be able to do what every other engineer does."

He plans to buy a talking calculator. "It'll tell me what numbers I punched in, do the operation, and read out the answer verbally to me," he explains with spirit. He also hopes to be able to buy an "Opticon, a scanner that can be put on written material and I get a verbal output."

The Opticon would be for the use of any blind space center employee.

Casey started with the space program in 1956 with the Space Task Group. He worked on Mercury, Apollo, Earth Resources, and shuttle design.

"Then my vision started kicking up on me." he said. "There was a massive

(Continued on page 3)

Frank W. Casey

"We will continue. . ."

Carter sets down civil space policy

In June 1978, President Carter directed the Policy Review Committee (Space) to appraise the future needs of the U.S. civil space program. The committee, chaired by Frank Press of the Office of Science and Technology Policy in Washington, released a President's Decision Memorandum the week of October 11, capsulized here:

Remote Sensing Systems: Specific details of the LANDSAT system will evolve over the next several years to get the right technology mix, test the organization, and find ways to involve the private sector.

Weather Satellites: The Defense community, NASA, and NOAA will review meterological satellite programs to see how much they can be consolidated in the 1980's.

The Private Sector: NASA and Commerce will prepare a plan of action to encourage private investment in civil remote sensing systems.

Future Applications and Economic Activity: It is too early to make a commitment to development of a satellite solar power station, the memo reads. However, there are useful intermediate steps that will allow development and testing of key technologies in space industry. The United States will pursue a program that will stress science and basic technology—integrated with a complementary ground R&D program—and continue to evaluate the costs and benefits of proposals.

Space Science and Exploration: The U.S. will maintain leadership in space science and exploration of the planets and will: continue a vigorous program to understand the origin and evolution of the solar system; in the years ahead, continue detailed reconnaissance of the planets, moons, and comets and asteroids; using the space telescope and free-flying satellites,the U.S. will continue to explore and seek to understand the universe; and we will use the Space Shuttle and Spacelab to do basic research on earth-based life science and human physiology.

BACKGROUND: Early in his Administration, Carter directed a National Security Council review of space policy. Completed in May of this year, the review led to a Presidential Directive that set the framework for the civil space policy completed this month, and capsulized here. Participating agencies were NASA, Commerce, Interior, Agriculture, Energy, State, NSF, AID, Defense, the CIA, Joint Chiefs of Staff, ACDA, and Domestic Policy Staff, the National Security Council, and the OMB.

3rd President airs space speculation

Sir

Your letter of the 15th is received, but Age has long since oblidged me to withold my mind from Speculations of the difficulty of those of your letter, that their are means of artificial buoyancy by which man may be supported in the Air, the Balloon has proved, and that means of dirrecting it may be discovered is against no law of Nature and is therefore posible as in the case of Birds, but to do this by macanacal means alone in a medium so rare and unassisting as air must have the aid of some principal not yet generaly known. However I can realy give no opinion understandingly on the subject and with more good will than Confidence wish you success.

(signed)
Th Jefferson

Monticello April 27, 1822

Don't miss the A.A.S.

More than 65 papers will be presented at the 25th anniversary conference of the American Astronautical Society at Stouffer's Greenway Plaza Hotel, Oct. 30 - Nov. 2.

Dr. Christopher C. Kraft, director of the space center will chair the session Wednesday morning on "Future Programs and Prospects-Projections to the Year 2000." Of the 66 papers scheduled for delivery, 21 are authored by NASA engineers and scientists. Twelve of the NASA papers were prepared by Johnson Space Center employees.

This year's program, "The Future of the United States Space Program," will feature discussions and presentations on a variety of topics ranging from"Reaping the Space Benefit," "Beyond the Shuttle," and "Constructing Space Colonies" to "Defense and the Future of the U.S. Space Program." Included in the four-day session will be a paper presented by Dr. Joseph Kerwin, who was one of the three astronauts aboard the first manned Skylab flight in May of 1973.

Richard S. Johnston, director of Space and Life Sciences at JSC, is executive chairman of the program. The first session "Arena for Change" begins at 1:30 p.m. on Monday, Oct. 30 and the final session is slated to conclude about 12 noon on Thursday, Nov. 2.

Dancers perform at Indian Awarenes program Oct. 10 in Building 2. The Alabama-Coushatta tribe toured the center and performed for children visiting from nearby schools. One Indian compared an arrow with a rocket to the moon. "The most splendid arrows in the world are in your head," he said. "How many Indians are in the audience?" he asked. Nearly all the children in the room raised their hands. New Trails Club thanks Joe Atkinson of the EEO and Bill Taylor, the projectionist, for helping make it happen.

Someone from the center is to be named a winner

You could be named Civil Servant of the Year.

Six federal employees in the Houston area will reign, names to be announced at the FEB-FBA annual awards luncheon Wednesday, Nov. 15 at noon at Kaphan's Restaurant (Main Street at Kirby).

A JSC employee will be named Outstanding Supervisor of the Year, *Roundup* has it from a reliable source.

Also the space center won the "Outstanding Achievement in Energy Conservation" award, and Joseph V. Piland, director of Center Operations, will be on hand to accept the honor.

Tickets for the luncheon are $6 in advance or $7 at the door and can be purchased through Roy Aldridge, our FBA representative, BE5 or ext. 5419. Beef stroganoff and broiled fish are the entree choices and there will be a cash bar.

Last August the Federal Women's Program Committee held a session on rape prevention and women's self defense. Ann Smith of the Federal Protection Service of Ft. Worth demonstrated what a woman should do if she should be attacked.

With the early sundown of winter, and women working third and second shifts, *Roundup* displays here photos, and some of the lessons learned at that session.

From the top: Smith shows that fingers to the face and eyes of the attacker (here portrayed by Bill Taylor) causes him to break his grip long enough for her to escape. Below that: Smith twists one or two fingers of the attacker, allowing her to escape. Third: You can break an assailant's elbow by turning your body, making a fist, and pushing his elbow outward. Bottom: If an attacker approaches, extend your hand with fingers straight and hit him in the stomach, knocking the wind out of him, as Ann Sullivan demonstrates.

The women were reminded to carry an object—a pin, pencil, car keys, etc., and if possible, avoid circumstances that could lead to an attack.

The presentation on rape prevention is an alert for all circumstances, for men and women.

EAA Attractions

DEAN GOSS DINNER THEATRE

The Theatre is changing its format from local talent to movie and TV personality leads. Along with the stars is an increase in ticket price, now $10 per person. Tickets are not good Friday, Saturday, and holidays. Regular prices are now $12.50.

TEXAS HUNTERS SAFETY COURSE

The EAA, in cooperation with the Texas Parks and Wildlife Commission and National Rifle Association, is offering the Texas Hunters Safety Course at the rec center Nov. 6 - 9, 6:30 to 9:30 p.m. The course is designed to teach basic hunter safety, firearms responsibility, game conservation principles, etc. Fee is $1 to cover materials, and the class is limited to 45. To register, contact Jerry Kilpatrick, x4626 or Jim McBride, x2541.

ON SALE AT THE JSC EXCHANGE STORE, Bldg. 11

- Disney Magic Kingdom cards—free (Fall and winter are the best times to go).
- Astroworld and Six Flags Fun-seekers cards—free.
- Astroworld tickets—$5.50 (regular $8.50).
- Astroworld Halloween Special tickets—$3 (8.50 at the gate).
- Six Flags tickets—$6.75 (regular $8.50)
- FBA presents ABC Theatre tickets at $2 each.
- Dean Goss Dinner Theatre—$10 per person; not good Friday or Saturday.
- General Cinema Theatres— $2.40 (regular $3 to $3.75).
- Soul Dance—$8 per person.

The JSC Exchange Store can special order any book in print for all NASA employees and contractors. Discounts depend on the policy of the publisher. You can place your order at the counter in Bldg. 11 or Bldg. 3, or mail it to the JSC Exchange Store, Code AW.

Homeowners, tally the wires

If your residence was built after 1965, the space center Operations Safety Branch advises you to consult the builder or electrical contractor to see if aluminum wire was used.

Reports have come from all over the U.S. of overheating and sometimes fires originating in wire connections to wall outlets and snap switches. Field reports show that when combinations of aluminum wire and certain devices were used, the possibility of overheating is greater.

If your home was built prior to 1965 and no additional or replacement wiring has been installed, there is little chance that aluminum wire was used.

"Do not attempt to make this determination on your own," the branch advises, stressing that you contact the builders.

There are signs of possible trouble. If you notice unusually warm face plates on switches, a strange odor in the area of the switch, or flickering of lights that can't be traced to other causes, "Consult a qualified contractor or electrician without delay," says the branch report.

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

Editor: Kay Ebeling
Photographer: A. "Pat" Patnesky

CFC cracks records JSC short of goal

JSC, through Tuesday, October 17, raised $147,372.74 or 69.8% of its goal of $211,178.00.

The Administration and Program Support directorate is the first of the center's major directorates to go over the top, peaking at 102% of its goal with 97.3% of its employees participating. Alma Martin of the Management Analysis Office deserves special praise for her leadership and perseverance in leading this sizable group over the finish line, Roy Aldridge, CFC Campaign Coordinator, said.

The Office of the Center Director has raised 229% of its goal; the Personnel Office-104%; EEO - 106%; the Legal Office - 102%; the Technical Planning Office - 119%; and the Earth Resources Program Office - 116%.

"With only a week to go, it looks like its going to be rough, but all that means is that we need to work harder," Aldridge said, "I speak with guarded confidence," he said.

The NASA Audit Office, Inspections Office, NOAA, SAMSO, MSFC, and the JSC Exchange, although not assigned a goal, were, "again this year most generous with their contributions," Aldridge said.

Roundup Swap Shop

Swap Shop advertising is open to JSC federal and on-site contractor employees. Goods or services must be offered as advertised, without regard to race, religion, sex or national origin. Non-commercial personal ads should be about 20 words and include home phone number. Typed or printed ad copy must be received by AP3/Roundup by Wednesday of the week prior to publication.

PROPERTY & RENTALS

Lease: Baywind, 2 br. condo, 1 1/2 bath, refrig., drapes, W/D connect. $325 mo. plus deposit. Avail. Oct. 16. 486-9305

Lease: University Green 4-2, 1/2-2, new patio home. Avail. Nov. $550 mo. plus deposit. 486-9305

Lease: CLC, new 1 br. condo, fireplace, drapes, appliances. $425 mo., deposit, no pets. 488-5019 after 5.

Rent: Furnished Lake Livingston retreat on the water, excellent fishing, boating, etc. By the week or day, off season rates. 554-6093.

For Sale: Need money for school, wooded undeveloped, one-acre lot of land at Beaver Creek, close to Lake Somerville. S. Schmidt. 333-4379 after 5.

For Sale: Two lots near Rye, Tx., (Big Thicket Lake Estates) near Bear-Foot Lake, 50' X 125' each, $1500 for both. Gatlin. 332-3287.

Furnished apartment for rent, adults only, no pets, all bills paid $185, week days after 3 pm. 643-8345.

Vacation Lake Livingston Cape Royale a beautiful resort community will all amenities, enjoy charming custom 3-2-1 compl. furn., home nestled among trees by the water. Rent wk./mo./yr. 488-4487.

Rent: Lakeside vacation retreat at Cape Royale on Lake Livingston. New 3-bdrm. waterfront home compl. furn., facil. inc. tennis, pool, golf, boat launch, 3 day min. 488-3746.

HOUSEHOLD ARTICLES

Twin beds w/box springs and mattresses, brass-plated headboards, $115, Student desk w/chair $75. 333-3508.

L/R & den set, end tables, coffee table, lamps, exec. cond. 482-5789 after 5.

GM love seat, child's safety seat, new, good cond. $40 and $15.

3/4 size roll-away bed, aluminum frame $35. Gatlin. 332-3287.

Antique Oak China cabinet, has mirror across top w/carved wood & claw feet, one of a kind. $850 Also shuttle type room divider, eight panels, 17 x 8 ft. each. $30 all. 488-5564.

48' innerspring roll-a-way bed $80 will deliver. 334-2305.

Solid rock Maple secretary's desk w/brass hardware, 32 1/2" x 18 x 40", perfect cond. $75. 474-2203. Poindexter.

CARS & TRUCKS

Motor Home, '71 Executive, 25 ft., one owner, self-contained, sleeps 6, 2 roof A/C plus dash, AM/FM stereo, extra clean. $12,900. 333-3508.

'72 Duster, automatic, AM/FM cassette PS, slant 6, 96,000 miles, economical. $700. Larry. 487-4325.

'76 Camero Rally Sport, great car, built in AM/FM eight track, C.B. radio, new tires, auto trans, pw. steering and brakes, air tilt wheel, 25K miles. X4904.

'76 CJ-7 Jeep, hard top, 4 wheel drive, 304-V-8, tach, positrac, new heavy duty clutch, AM/FM cassette, headers, new mufflers & exhaust system. $4950. 780-9189 after 5:30.

16-foot custom Tri-hull, 85 HP Mercury, E-Z roll trailer. Excl cond. $2700. 481-2995.

'77 Datsun 810, PS, PB, AC, AM/FM stereo, CB cassette player, cruise control, low mileage, extended transferable warranty, exc. cond., many other extras. Jones. 488-8119.

'71 Super Beetle, new tires, few dents, needs engine overhaul $500. 334-1303 after 5.

'67 Chevrolet Impala, 9 passenger station wagon, auto trans. pwr. stg., air cond., V-8-327 engine, new battery, orig. paint, exc. cond., original owner. 944-4581 $800.

'76 Cadillac, fully loaded, power windows and seat all work, stereo, 8-track leather seats, exc. cond., no rust, uses no oil. $999. Peacock. 486-0154.

'75 Granada, AC, PS, PB, good tires, 33,000 miles, AM/FM tape stereo, good cond. $2995. Ronny Moore. 486-0943.

'78 Chevy pickup, 1/2 ton silverado, AC, PS, Cruise control, ralley wheels, 15,000 mi., edc. cond., owner purchased '79, Hester. 332-2291.

'72 VW camper, pop top AC, new radials new engine under warranty, near perfect cond. $2500 or best offer. 482-9514.

'71 Coupe DeVille, Good transportation $750. McClenny. 782-3620.

'76 Rabbit, 2-door, Air, AM/FM stereo; 4-speed, 35,000 miles, Brown. $3,195. 482-7329 after 5.

BOATS & PLANES

16' Sailboat w/trailer, 95 sq. ft. sail, good condition $350, firm. Larry. 487-4325.

Irwin 32 1/2 Sailboat equipped to live aboard, center cockpit, aft cabin, pressure water and air. 488-7382 or 474-3187.

CYCLES

27" Men's Columbia 10-speed bike, good cond. $50. 333-5125 after 5

73' Yamaha 125 Enduro, $275 excellent running condition. 474-2112 after 5 weekdays, anytime weekends.

MUSICAL INSTRUMENTS

Trombone, Conn Constellation, silver-plated, with carrying case $450. 333-3508.

CAMERAS & STEREOS

Child's G.E. Stereo phonograph with 2 speakers, plays 33, 45 & 78 rpm records, has jack for headphone, stand included, like new. $25. Jack Cohen. 488-3171.

MISCELLANEOUS

Ladies exercising machine, reclining combo vibro and heat massage $25, fiberglass surfboard $25, go cart, professionally built and raced in national championship competition. $200. 333-3508

4 Sears Steel belted radials, 175 X 13 mounted on ET mags, fit Toyota but can be adapted to other 4-bolt wheels, less than 5000 miles. $150. Gatlin. 332-3287.

Rockhounds — I have a good selection of slabs priced to sell. 4114 Shady Springs Dr., Clear Lake Forrest. 333-2787.

Ladies' Golf Clubs, Louise Suggs, 3 thru 9 irons, Walter Hagen Driver, 3, 4, & 5 Woods Blade Putter & pull cart. $75. Floyd Avey. 474-3609 after 5:30.

Automobile coil spring compressor, like new $20. Bauch. 333-3382.

Volkswagon parts: R & L doors, engine covers, rearbumpers, hubcaps, chrome, tires, trans axel ('66) windows (side & rear) and more. 334-1303 after 5.

$21 face value postage stamps for $20. Also 100 Cook pair strips for $170. 482-5393 after 5 or weekend.

PETS

Excellent watchdog, loves children, needs good home, male, approx. 2 yrs. old, free. 433-8422. Barbara.

WANTED

Need two tickets for Arkansas/Texas A & M game. Will take a single. Verby 946-3907 after 5.

Photo courtesy of Bay Area Running Club

Stan Fink posts results of the run

What's cookin' in the JSC cafeteria

WEEK OF OCT 30 - NOV 3

MONDAY: Chicken Noodle Soup; Weiners & Baked Beans; Round Steak w/hash browns; Meatballs & Spaghetti (Special); Okra & Tomatoes; Carrots. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin; Selection of Salads, Sandwiches and Pies.

TUESDAY: Beef & Barley; Shrimp Creole; Beef Stew; Fried Chicken (Special); Mixed Vegetables; Stewed Tomatoes; Buttered Rice.

WEDNESDAY: Mushroom Soup; Fried Perch; New England Dinner; BBQ Plate; 8 oz T-Bone Steak; Shrimp Salad; Swiss Steak (Special); Italian Green Beans; Beets; Lima Beans.

THURSDAY: Cream of Chicken Soup; Turkey & Dressing; Enchiladas w/chili; Weiners & Macaroni; Stuffed Bell Pepper (Special); Zucchini Squash; Green Beans.

FRIDAY: Seafood Gumbo; Broiled Flounder; 1/2 Chicken w/peach half. Fried Shrimp; Shrimp Salad; Salisbury Steak (Special); Mixed Vegetables; Cabbage; Breaded Okra.

WEEK OF NOV 6 - 10

MONDAY: Chicken & Rice Soup; Texas Hots w/beans; BBQ Ham Steak; Veal Parmesan; Beef & Macaroni (Special); Spinach; Carrots; Au Gratin Potato, Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin; Selection of Salads, Sandwiches and Pies.

TUESDAY: Tomato Soup; Baked Chicken; BBQ Spare Ribs; Mexican Dinner (Special); Broccoli; Spanich Rice; Ranch Beans.

WEDNESDAY: Clam Chowder; Liver w/onions; BBQ Ham Steak; Shrimp Salad; Baked Meatloaf (Special); BBQ Plate; Brussels Sprouts; Green Beans; Whipped Potatoes.

THURSDAY: Beef & Barley Soup; Chicken & Dumplings; Corned Beef w/cabbage; Smothered Steak (Special); Cauliflower; Cabbage; Parsley Potato.

FRIDAY: Holiday

At Gilruth Center

Gulf Coast AAU 20 KM Championships Hosted At JSC.

The Bay Area Running Club, (BARC) hosted the 1978 GAAU 20 KM Championship at the Gilruth Recreation Facility on Oct. 7. Many NASA employees took part along with other runners from around the Houston area. Nearly 400 runners in total were on hand. Most ran in the featured 20 KM event, but there were 5 KM and 1 mile races offered too. BARC runs a number of events throughout the year at the Gilruth Center, made possible through the cooperation of the Gilruth Recreation Facility and other JSC offices, strong support of the EAA, and scores of volunteer BARC workers. If you haven't attended one yet, you should. There is one BARC race left on the 1978 Rec. Center schedule. A six mile and 1 mile event will be held on Sunday Nov. 26 at 3 p.m.

And at the links

Forty-four NASA and Boeing Golfers challenged the links at Pasadena Ellington on Saturday, Sept. 23.

The JSC team handily won the Duffers Cup Trophy with a combined team net score of 1255 against 1376 for Boeing. (Wow!)

The trophy is on display in Martin Raines' office in Building 45 until the next tournament.

In the best ball foursome competition there was a tie at 17 under par.

Cal Mitchell won the men's long drive and closest to pin for an even dozen golf balls. Del Hill won the women's long drive for six balls.

"We didn't exactly tear the course up," said A. C. Kraus. "Our best gross score was 86."

Casey. . .

(Continued from page 1)

amount of reading to do in the Shuttle Program Office, so I came into this outfit about four years ago."

He retains enthusiasm about his work. "There are events that will put a solar array out," he says. "And I am calculating the percent of decrease caused by normal activity such as the Van Allen belts."

He is also developing ways to use mass shielding or magnetic fields to protect solar cells in space.

Adjusting to life without sight is not easy. "The cane is useful," he says. "But I'm tall, I'm 6'5". The tree branches, overhead objects, are deadly.

"Also, I walk a lot, I live in Nassau Bay. And crossing Nasa One is a sporting proposition."

Casey gets encouragement and assistance from co-workers. "The secretaries are excellent about helping with typewritten memos," he says. "Most of the engineers are willing to help. If everybody is busy, I get out my magnifier and go the slow route.

"The people at Texas Commission for the Blind are super enthusiastic," he adds. "And there's always motivation. I'm gonna give it a good try."

PREVENTION

Blindness is a condition that affects both the social and economic status of many persons in the United States.

Loss of sight is more prevalent among older persons and reflects the fact that the most frequent causes of blindness generally have their onset in middle and later life. These include specific conditions of unknown etiology; particularly glaucoma, cataract, and general disorders such as arteriosclerosis, high blood pressure, nephritis, and diabetes. Glaucoma and cataract account for nearly one-third of all cases of blindness.

Find out about glaucoma and other eye disorders at the JSC Health Education Program held on October 31, 1978, in the Building 30 auditorium at 1:30 p.m. The speaker will be Dr. Larry Brenner of the Bayshore Ophthalmology Clinic. Dr. Brenner will be available to answer any questions you may have regarding one of your most valued possessions — your SIGHT!

You'll see them everywhere. . .

Doctors recommend running in space

by Kay Ebeling

You're running. Heart rate is past 180, oxygen and blood pump through your veins and rush to your fingertips. Clear-headed intoxication. You do this every day, getting stronger, running harder every day. Twenty minutes, three miles, that's enough for now. Unbuckle your bungee and float up to the wall to stretch your legs.

Opinion has it that running is the best exercise on Earth; results of Skylab show it's also the best exercise in space.

One problem of weightlessness is blood rushes to the upper half of the body, puffing up the face and deteriorating the legs. At zero-g, normal daily movement requires little effort, and muscles atrophy from disuse leaving your legs limp like they've been in a cast for months.

At zero g, normal movement requires little effort, and muscles atropy leaving your legs limp like they've been in a cast for months.

"The main problem is it's a totally new experience," says Carter Alexander of the Medical Services Division. "Exercise is not work in space. You need artificial devices to make the individual work. But adapting to space is not any big black mystery, it's a natural reflex."

After Skylab 2, astronaut Bill Thornton went to work designing such an artificial device. "We could only take a few pounds up," Thornton said. "I decided the thing the body needed was to be able to walk."

The first Skylab crew had worked out on a bicycle ergometer, but leg muscle mass loss on their return was still too high.

Thornton came up with a sheet of teflon on the floor. Crewmembers donned wooly socks so they could "slip on it," and tied themselves down with bungees to provide a force like weight.

"We called it Thornton's Revenge," says Ed Gibson, crewman on Skylab 4, the first to test the treadmill. The bungees made them weigh over 200 pounds, but crewmen were still grateful.

"It looked like a tremendous contraption," Gibson says. "But it allowed us to work the legs in a way you can't up there. The calf muscles are the ones that really suffer. You'd get on Thornton's Revenge in your stocking feet and you could jog or run or just jump up and down."

Thornton describes the device: "By tilting the teflon strip it was like walking up a slippery hill. What you do is start one foot down and it's slippin' and then you pick the next one up and you slip, and it's like climbing an icy hill."

And "as crude and as simple as that was," leg strength percentage loss went down 20 percent after Skylab 4, as Thornton pointed out in the Life Sciences Symposium in 1974.

The American business executive spends eight hours a day at a desk, rides an air conditioned car the half-hour drive home, eats a heavy dinner though not really hungry after a business lunch, and stands a 54 percent chance of dying from heart disease at an early age.

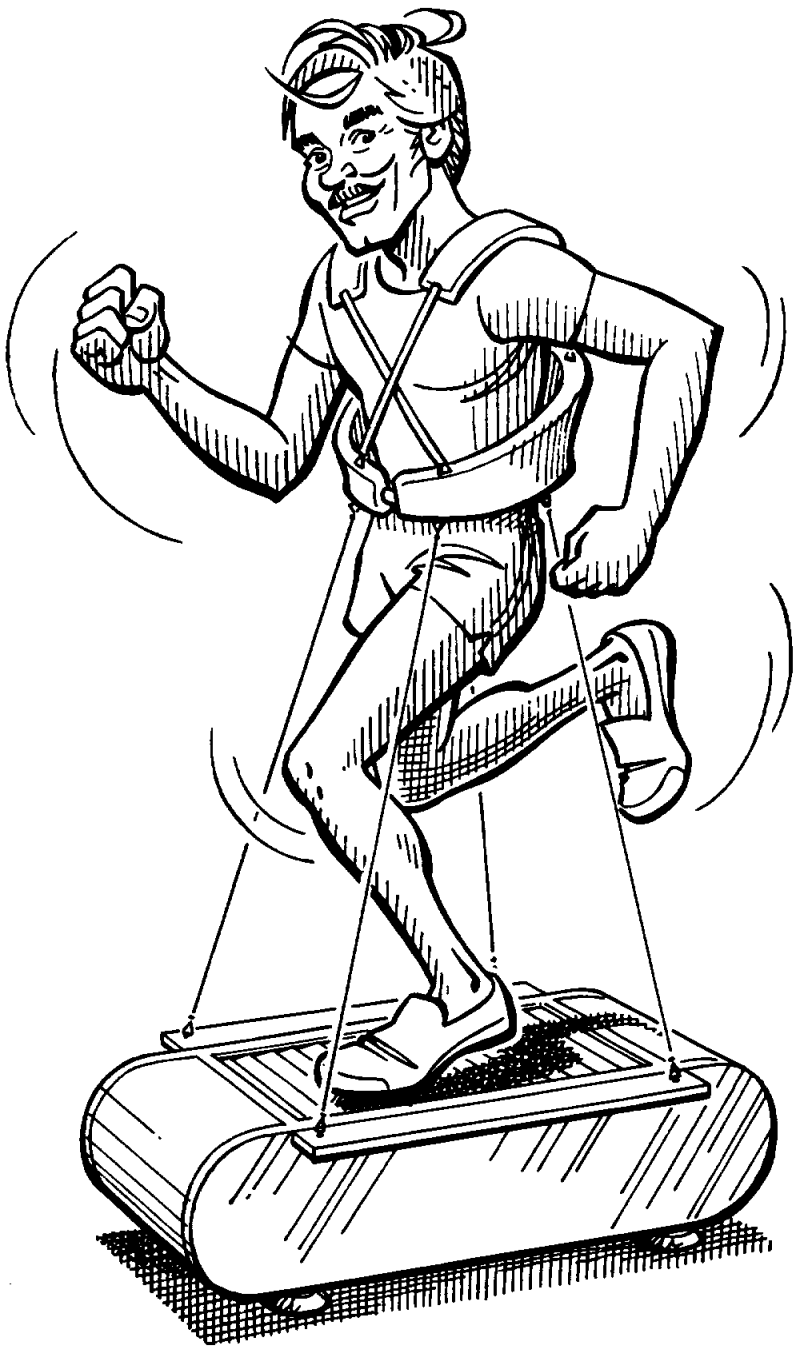
"Why exercise on Earth?" asks Thornton. "Exercise makes people feel good, and it lets you live a long and healthy life.

"Space is a kind of acute laboratory for some of the changes you see on Earth," adds Thornton. "On Earth it may take years, in space it can happen in a matter of weeks."

Thornton takes a long drink from a can of tomato juice. "Excuse me," he says. "I've just gotten off the track and I'm thirsty."

He continues: "Now, you're not going to change this body in one week in space, or one year in space, or anything else. But space can rapidly change the body."

So in Building 37 the Cardiovascular Lab is developing a structured program of in-flight exercise to "minimize decompensation and maintain cardiovascular fitness," Alexander says. To test the machines on Earth, they pick the subject up with a boom or parachute hoist, then tie him back down with the bungees.



On the first few missions the teflon-strip-and-wooly-sock technique will be used. After that, Thornton's 30-pound collapsible device that can be folded and packed into a shuttle drawer will fly along with a mini-gym.

On the first manned Skylab mission, "We thought the capacity to exercise would deteriorate," says Alexander. "But it didn't. It turned out the crew liked to use the ergometer for personal exercise."

As to muscle loss, "If exercise doesn't ameliorate it totally, it certainly minimizes it," Alexander says.

Joe Kerwin relates this anecdote:

"On the first Skylab mission, we were the first to use the bicycle in weightlessness. We saw some problems on the ground—how are you gonna stay on the bike, every time you push the pedal your body is gonna float up to the ceiling.

"So we designed triangle shoes that locked into the pedals, and we designed a very complex padded harness—a big thick waste belt with rings and straps that fastened it to the seat of the bicycle—we had a seat on the bike, OK?—and a shoulder harness that you could snug down.

"We got up there, put all this harness on, got on the bike, and started to pedal. And it was terrible. Because your body pushed up against all those straps, you cut off the circulation in your legs, the chest vest restricted respiration and you couldn't breathe. By the time your heart rate reached 140 you had to quit. It was painful. It was excruciating. It was totally impractical.

"We reported to the ground and spent about five days experimenting—with ropes tied to the floor where you'd hang on by your hands, and padded towels on the ceiling.

"Finally about day 9 we made the amazing discovery that if you took the harness and wrapped the shoulder strap and the waste belt around it, and threw it away, you could exercise just hanging on with your hands. Your body posture—you kind of lean forward—was all you needed. It took us about nine days in flight to figure it out."

The question of how long, and when to start exercising in space is still up in the air. "After 28 days, you better exercise or you're not going to be able to handle gravity." Kerwin says. "Somewhere in there is a breaking point. Thornton says it's 7 days, I think 14."

Says Thornton, "Twenty minutes a day should be enough. The most important thing is motivation, not regimentation. It's self motivation that keeps this bunch of people in great shape."

"Space is a kind of acute laboratory for some of the changes you see on Earth. Here it may take years, in space it can happen in weeks."

You'll see them—more and more employees, hitting the jogging tracks at nearby high schools, or the track now proposed for the woods behind Gilruth Center.

Floating in front of a Spacelab control panel operating solar cameras will leave you groggy, catnapping, and unable to sleep at night. Sitting at a table writing programs or mid-term reports will leave you yawning and unable to summon strength. On Earth, in space, we need exercise.

"You don't have to be a running nut," says Thornton. "You can walk perfectly well, or bicycle. Anything to maintain the body. Cause the body was designed to be used, and if you don't, there's going to be trouble. It's as simple as that."

At left: Al Bean tries the towel on the ceiling technique on Skylab 3. Below: Joe Kerwin floats doing calisthenics on Skylab 2, and Charles Conrad extends an arm.

NASA-JSC