

11-7-1990

Avion 1990-11-07 (B)

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Space Technology

B

Volume 67, Issue 9

November 7, 1990

Robots will maintain space station

by Russell E. Darling
Space Technology Writer

A recent NASA report indicates that 2,200 hours of extra vehicular activity (EVA) will be required for space station maintenance. To cut down on the number of spacewalks by astronauts, NASA has indicated that robots will be utilized for much of the station maintenance. This would not only free astronauts to conduct more scientific work, but it would keep them from being exposed to the harsh environment of space for long periods.

Although technologically advanced, the robots will not be able to work completely on their own. They will require the skills and experience of a human operator. The astronaut operating the robot would stay safely inside the station. Through visual and tactile interfaces, the astronaut operator will be able to control the robot and actually feel as if he were out in space doing the job himself.

This technology is called Telepresence. Using this technology, the robot will be able to mimic every move of the person controlling it. If the operator looks left or right, he would see the left or right view provided by the robot's video cameras. Exact movements of the operator's hand would be

uplicated in the robot's "hands." The operator would also be able to sense and control the amount of force exerted by the robot's appendages.

Private companies such as VPL Research and the Spatial Perception and Advanced Displays Laboratory at NASA/Ames Research Center are currently developing Telepresence technology. Many advances have already been made. VPL, Redwood City, California, has developed several devices that are able to transport people into artificial or simulated existences. In this "virtual reality" a person can repair a damaged air-lock on the space station, search for valuable minerals in the craters of the moon or even explore the miniature world of a circuit board.

The centerpiece to virtual reality is the computer. A real or imagined place is generated by the computer and is visually represented with the computer's graphics. This virtual reality "world" is only limited by the sophistication of the computer's graphics and memory capabilities. Everything that is done in virtual reality is a simulation; therefore, nothing real is ever at risk.

"Seeing is believing" as the saying goes, so VPL has developed a device that would make the wearer believe he is in the computer generated world. The

device is a pair of stereo-vision goggles called the EyePhone. Not only does the device produce 3-D images, it also senses the direction that the wearer is looking and appropriately adjusts the display. If the person wearing the EyePhone looks up, for example, he will see what is above his simulated world. The movements of the head cause the image to scan in the direction of the head movement, just as a person sees when not wearing the goggles.

To be useful one needs not only to be an observer, but a participant, in virtual reality. To accomplish this, VPL has created the DataGlove. The glove is equipped with fiber-optic sensors that transmit every move made by the hand to the computer. The person wearing the DataGlove is now able to manipulate objects within his simulated world.

While the applications of virtual reality are practically limitless and have merits of their own, the technology developed by VPL will aid in the development of an operational Telepresence system. Instead of working within a computer generated world, people will be able to work within the real world using the same interface devices. They will work in one location while actually being in a completely different location that is safer and more comfortable.

With so many possible applications, Telepresence will play an important role on the space station as well as on future missions to the moon and Mars.



Future tools...

The person in this photo is wearing the EyePhone and the DataGlove exploring a computer generated virtual reality program. Astronauts inside the space station will use these techniques and instruments to guide robots on the station maintenance.

NASA has indicated that robots will be utilized for much of the station maintenance.



Experimental expansion...

The Spacehab module will be placed in the forward compartment of the space shuttle cargo bay.

Modules will expand shuttle experimental area

by Roland Houle
Data Technology Editor

NASA is planning to meet the demand that has been placed upon it for man-tended research and development activities by using Spacehab modules.

In these truncated metal cylinders, middeck type lockers, space station racks or life sciences equipment can be carried for the conduct of microgravity experiments. They may also be used as testing areas for space station hardware and procedure development requiring or benefiting from man-tended participation.

The additional 1100 cubic feet of pressurized volume from the Spacehab module may ease more than three year backlog of astronaut-tended experiments in scientific, military and commercial fields. The company is marketing access to the module and its support facilities on a

commercial basis.

While only taking about one fifth of the cargo bay area, the module can provide up to 69 middeck lockers, up to two double space station racks and 21 middeck lockers, or a combination

...Spacehab module may ease the more than three year backlog of astronaut-tended experiments in scientific, military, and commercial fields.

The module will be attached to the shuttle crew compartment through a standard NASA tunnel adapter.

In August 1988, Spacehab, Inc., and NASA signed a Space Systems Development Agreement in which NASA agreed to provide six Space Shuttle flights for Spacehab beginning in 1991.

With two full and one test module currently under construction, the first Spacehab module is on the official NASA Shuttle manifest for a first flight in November 1991 with additional module flights scheduled to fly in 1992 and 1993.

Spacehab, Inc., based in Washington, D.C., plans to commercially market the spaces in the module. To date, between 30 and 50 percent of the available spaces have already been reserved for the first six flights. Two-thirds of these by NASA.

The prime contractor for the Spacehab modules is McDonnell Douglas Astronautics Company based in Huntsville, Alabama. The

modules are currently in the detailed design and construction phase.

The principal subcontractor is Aeritalia based in Torino, Italy. This is the builder of the Spacehab modules for the European Space Agency (ESA). Their main task is to build the primary structures and develop the passive control systems for the modules.

In the future, Spacehab plans to build Space Station Support Modules, which will add to the operational flexibility of the Space Station Freedom by providing 1500 cubic feet of pressurized volume to any space station node.

The modules will be ready for flight in the late 1990's shortly after the space station becomes operational. The exact number of these units will be determined by the market demand for man-tended experiments.

Space news...

Secret launch is "no-go"... Shuttle mission STS-38 with space shuttle *Atlantis* has been delayed. The secret mission is dedicated to the Department of Defense (DOD) and not many specifics were given out. NASA shuttle director Robert Crippen stated "NASA is working with the Air Force to help resolve the anomalies discovered during cargo testing. Due to the classified nature of the payload, details of the work being conducted can not be discussed. I am confident that the launch team will resolve the problems so that *Atlantis* and the STS-38 mission can be launched. At this time, we are continuing to proceed with the schedule to fly STS-38 before STS-35."

The two space suits that are routinely carried on board the space shuttle during flights were installed yesterday in the air lock inside the shuttle. A new launch date will be set after all problems with the classified cargo are resolved.

New shuttle parts arrive at KSC... The first of three main engines for the new orbiter *Endeavour* arrived at the Kennedy Space Center (KSC) last Tuesday. The engine was brought from Stennis Space Center and will be stored at the Vehicle Assembly Building (VAB) at the KSC. At the VAB's main engine shop, the engine will be uncased and inspected. When the new shuttle *Endeavour* arrives on May of next year, the engine will be integrated to it.

Orbiter update

Columbia (OV-102)

Auxiliary power unit #1 was replaced yesterday and a hot firing is planned for next week. A helium signature leak test of the liquid oxygen side of the main propulsion system was completed on Monday.

Flow checks of the aft reaction control system have been completed. Work is continuing to restore the aft compartment back to normal launch configuration. *Columbia* and the *Asro* payload are being prepared for launch on Mission STS-35 after *Atlantis* and Mission STS-38 are launched sometime this month.

Space shuttle *Columbia* is currently poised for launch at Pad 39-B of the Kennedy Space Center.

Discovery (103)

The nose cap of *Discovery* was pulled yesterday for inspections. Preparations to remove inertial measuring unit #1 inside the nose cone have begun. A functional testing of the waste containment system is scheduled for this week.

Preparation for heat shield removal have begun in order to remove the three main engines on Friday. The engines will be transferred to the engine shop in the Vehicle Assembly Building (VAB) for refurbishment.

Space shuttle *Discovery* is currently at the Orbital Processing Facility 1 (OPF 1).

Pegasus is now taking launch reservations

by Marcelle Gibson
Space Technology Writer

The Pegasus Air-Launched Space Booster successfully launched for the first time in April. The event marked the first time a privately developed space launch vehicle has carried a payload into space.

The PEGSAT payload, carried aboard the first Pegasus flight, was developed by the Defense Advanced Research Projects Agency (DARPA) and NASA's Goddard Space Flight Center. The satellite payload contained instrumentation to monitor variations in spacecraft altitude, temperature, pressure, structural loading, and vibrations. Once in orbit, PEGSAT launched a small communications satellite for the Navy. Then PEGSAT acted as a chemical release satellite to provide tracer elements for Earth magnetic, and other plasma experiments.

Highly capable light satellites, or "lightsats", like PEGSAT are far cheaper than conventional billion dollar space systems. Previously, companies expect \$50 - \$125 million in additional booster costs. The space shuttle requires three months of servicing by nearly 11,000 technicians at a cost of \$250



Wind beneath my wing...

The Pegasus Booster was launched successfully last April. Its payload was provided by the Defense Advanced Research Projects Agency (DARPA)

million to make a round trip into space. A failure can waste a billion dollars. For example, Martin Marietta failed to put a \$150 million dollar commercial communications satellite into proper orbit. Lawsuits are now in progress.

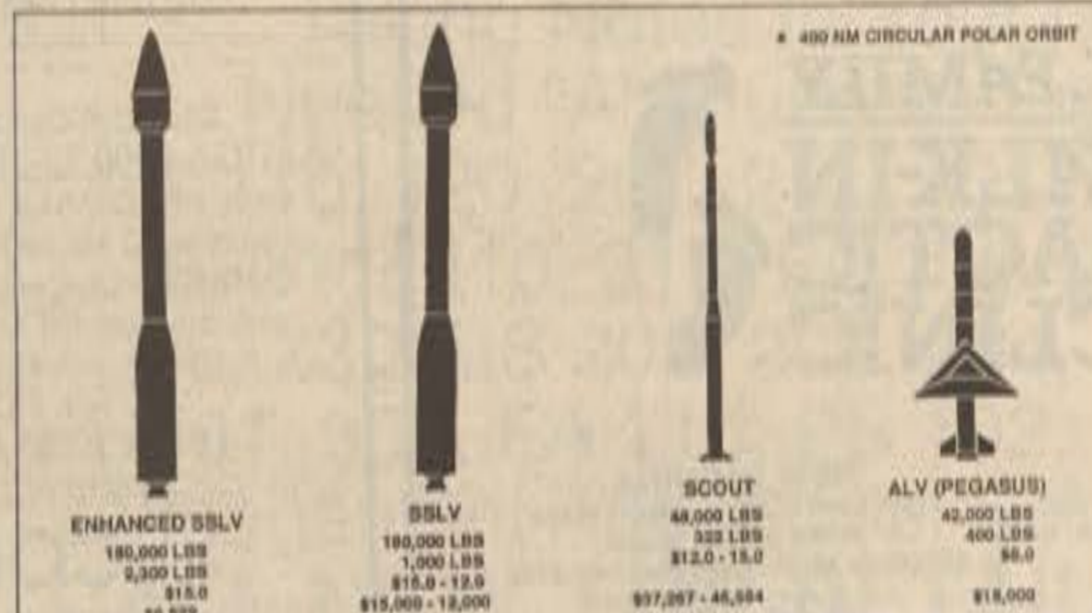
Alternately Pegasus and PEGSAT cost a mere \$1.5 million and \$6.5 million, respectively. Since Pegasus does not rely on a space center like Cape

Canaveral for blast-off, costs are greatly minimized. Further, competition for launch sites has led to frequent delays in commercial and military programs. The Pegasus requires only an airport runway to begin its journey into space. Pegasus is currently carried to the drop altitude by a refitted B-52 bomber. Future plans will launch Pegasus from specially outfitted wide body jets, like Lockheed L-1011's or Boeing 747's.

Pegasus pioneers an innovative approach for launching small satellites into orbit around the Earth. Instead of blasting off from the ground like conventional boosters, the three stage solid fuel rocket is released from an airplane at 40,000 feet. The first stage ignites and the triangular wing lifts the vehicle to the edge of the Earth's atmosphere. Then, the second stage takes Pegasus into the required orbital trajectory, just like conventional rockets.

The success of Pegasus last April marks the beginning of the commercialization of space. Orbital Sciences Corp. (OSC) and Hercules Aerospace Co. used privately raised capital for the effort. Today, only a handful of companies are engaged in space related work not underwritten by the government.

The virtually flawless launch put to rest questions about the unusual technology. Pegasus is the first all new space booster developed in the United States in 20 years. Companies in both the United States and Europe, like Orbital Communications, Motorola, and Swedish Space Corp., are actively negotiating Lightsat launches. Further, OSC has two major government procurements pending with NASA and the Air Force. DARPA plans to launch its next Pegasus payload in early 1991.



Little ones first...

Pegasus is the smallest of the current launch vehicles. The Scout has been used successfully for small payload launches while the SSLV and the Enhanced SSLV are used for heavier payloads. Pegasus is clearly less expensive than its closest competitor, the Scout.

Retired SR-71s fly on at Edwards

by John McDermott
Aeronautica Writer

NASA Ames-Dryden Flight Research Facility at Edwards AFB, California is home base for three Lockheed SR-71A Blackbirds, still the nation's fastest and highest flying aircraft more than 25 years after its first flight. The SR-71A's are on loan to NASA from the U.S. Air Force, which retired the aircraft from military service in early 1990.

The SR-71A, was originally designed in the early 1960's for Air Force use as a strategic reconnaissance platform. NASA plans to employ its three aircraft as high-speed testbeds for research opportunities and experiments that can benefit from the Blackbirds unique capabilities.

The SR-71A can fly at speeds greater than 2,200 mph and to altitudes higher than 80,000 feet.

The aircraft is 107 feet long and weighs about 34 tons empty.

It carries 20 tons of special JP-7 fuel (enough for about two hours of flight time) in its fuselage and wing tanks. Two Pratt and Whitney J58 engines, each rated at 32,500 pounds of thrust, power the SR-71A.

The Blackbirds that NASA received carry tail numbers 17967, 17971, and 17980.

The Blackbirds that NASA received carry tail numbers 17967, 17971, and 17980. NASA has a tradition of Mach 3 flight research. From 1969 to 1979, Dryden ob-

tained valuable high-speed research data operating several YF-12 aircraft, which were prototypes of the SR-71A.

In nearly 300 flights, the YF-12s performed extensive studies on structural design, stability, and control of air-breathing aircraft at very high speeds and altitudes.



photo courtesy of NASA

The wanderer...

At the NBAA convention, Cessna Aircraft Company announced that the new single engine turboprop will fly a worldwide demonstration tour following the show.

Grand Caravan to tour the world

by Tami Strout
Staff Writer

Cessna Aircraft Company revealed the newest member of its Caravan utility turboprop line, the Grand Caravan, at the National Business Aircraft Association convention in New Orleans. The new aircraft is the largest passenger/cargo single-engine turboprop in production today.

The Grand Caravan is a multimission aircraft that can easily be switched from a cargo carrier to a passenger carrier in just 20 minutes," said Roy H. Norris, Cessna's senior vice president of marketing. "Our customers and prospects said they needed a larger version of the standard Caravan. Cessna has responded by producing what we believe is the most versatile utility aircraft available."

Norris said the Grand Caravan offers 340 cubic feet of cargo hauling capacity, and can carry 111 cubic feet more with an optional cargo pod installed under the fuselage. The aircraft can carry up to 14 people which depends on selected seating configuration and a country's aviation regulations. Passengers will have the same amount of room as first class passengers have in a typical airliner in a 10 seat configuration. The passenger seats are easily removed and reinstalled when switching between the commuter and cargo configurations. Customers can also mix and match any of five new interior color schemes, including fabric options for seats and carpet. The improvement in climb performance in speed is due to the Grand Caravan being equipped with a more powerful, 675 shaft horsepower, Pratt & Whitney PT6A-114A engine and an all metal McCauley propeller. The aircraft's maximum useful load is 4,862 pounds.

"The PT6A engine has been proven during more than 60 million flight hours, establishing itself as one of the most dependable and efficient engines in the world," Norris said.

The Grand Caravan has a seven inch shock absorber paired with its spring steel main gear and nosewheel landing gear that allows it to operate out of rough fields. Cruise speed of the Grand Caravan is 182 knots (209mph), and its maximum range is 963 nautical (1,108 statute) miles.

The aircraft can clear a 50 foot obstacle on takeoff, using only 2,420 feet of runway. Landing under the same conditions requires just 1,660 feet.

Stressing the Caravan's reliability, Norris said the fleet of more than 400 Caravans has flown more than 500,000 hours, while recording a dispatch reliability rate of 99 percent.

Along with the unveiling of its new Grand Caravan at the NBAA convention, Cessna announced that the new single engine turboprop will fly a worldwide demonstration tour following the show. The Grand Caravan is the largest multimission, single engine turboprop currently in production.

Matt Amsden, marketing communications manager for the Caravan line, said the four part tour for the new multimission aircraft will begin October 8 and will run through mid-1991.

The first two legs of the tour will be completed early in January 1991. Stage two of the Grand Caravan world tour begins in Miami on November 12, before moving on to several Caribbean islands and republics, South America, Central America and Mexico.

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November 12, before moving on to several Caribbean islands and republics, South America, Central America and Mexico.

The third and fourth legs of the tour will be flown during 1991. The third leg will take the Grand Caravan throughout North Africa, the Middle East, sub-Saharan Africa and Europe.

Part four of the tour will include all of the eastern United States and Canada. The full schedule for 1991 will be released when final details are confirmed.

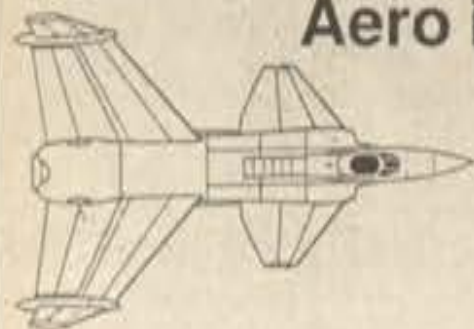


photo courtesy of NASA

Fast flyer...

NASA Ames-Dryden Flight Research Facility at Edwards AFB, California is home base for three Lockheed SR-71A Blackbirds, still the nation's fastest and highest flying aircraft more than 25 years after its first flight.

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Halloween brings out goblins at a Coliseum ball

by Joe Cambron
Managing Editor

It's the night of the ball, and the witches are prowling. In the distance I swear the werewolves are growling.

The air is heavy with music and scent. The lights in the distance provide a hint.

The crowds are surrounding the door like a swarm. Not a soul can be found asleep in the dorm.

Pumpkins adorn a grand mausoleum, its Halloween night at the club Coliseum.

Last Wednesday, the Coliseum night club on Beach Street played home to the avant garde of the ghoulish set. Patrons dressed in every conceivable costume, packed the club in hope of winning \$2,000 in prizes for the best costume.

One of the best, and most unusual, entries in the contest was a pair of eight foot Robocops. They achieved their enormous height by sealing their feet in one foot square aluminum foil covered boxes and extending their helmet almost a foot over their real heads.

Mike Rank and Catherine Welch came as "Sodman and his hobo." This pair completely enshrouded themselves in yard sod, complete with "keep off the grass" stakes on Catherine's chest.

Brett and his wife Suzanne Nielson dressed as the evil alien the Borg. Their costume was incredibly detailed, and virtually identical to the one used on TV show. (The Borg kidnapped Captain Picard in the *Star Trek: The Next Generation* season cliffhanger, for those who do not



Dancing on the ceiling...

Devo made a special appearance (left), while mummies moved to the music (center). Other unusual creatures prowled around the club, such as this strange animal that roamed in search of the contest judges (right).



watch.)

A dozen or so French maids made appearances at the ball. Both Bishop, Sherry Potter and Tamara Strayer were arguably the elite of this provocative group.

Clay Kraski and Myles Casputaro came dressed for heavy combat in the Gulf or any other battlefield.

These two Ramboes would have looked right at home in Saudi Arabia. Jim Freeman's costume left me so speechless that my notes read "mammal." Saying that his con-

torted creature had a spine is probably speculation, maybe he was a giant slug. Whatever the case, it was a very good costume.

A triad of females accepted the responsibility of stirring the crowd as three foxy felines. Stephanie Richardson, Jill Williams and Laura Cobb may not have won the contest, but they probably

got almost anything else they wanted.

their dancing, Cinderella's shoes must have fit. Tyler and Mary Ann Parks came painstakingly packaged as Halloween mummies.

Finally, Kaori and Saso Mitsuruohata came attired as the best of the devils. This was probably the most popular costume.

Others were surfer girls, angels, pigs, Romans, road workers, and just about everything else. The other half of the crowd was even more grotesque, they came without costumes.

All kidding aside, proper attire for Halloween night was a smile. Everyone seemed to enjoy the fun. Hopefully some of the people mentioned above are already planning for next year.

*It's the night of the ball,
and the witches are prowling.
In the distance I swear the
werewolves are growling.
Pumpkins adorn a grand mausoleum,
its Halloween night at the
club Coliseum.*



The wild and the wacky...

Stephanie Richardson, Joe Williams and Laura Cobb meow for the camera (far left). Brett Nielson and Suzanne Nielson plan to take over the Earth (left center). Clay Kraski and Myles Casputaro prepare for the draft (right center). Mike Rank and Catherine Welch water each other's lawns (far right).



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Calvin and Hobbes

by Bill Waterson

ON THE ONE HAND, IT'S A GOOD SIGN FOR US ARTISTS THAT, IN THIS AGE OF VISUAL BOMBARDMENT FROM ALL MEDIA, A SIMPLE DRAWING CAN PROVOKE AND SHOCK VIEWERS. IT CONFIRMS THAT IMAGES STILL HAVE POWER.



ON THE OTHER HAND, MY TEACHER'S REACTIONARY GRADING SHOWS THAT OUR SOCIETY IS CULTURALLY ILLITERATE AND THAT MANY PEOPLE CAN'T TELL GOOD ART FROM A HOLE IN THE GROUND.



THIS DRAWING I DID OBVIOUSLY CHALLENGES THE KNOW-NOTHING COMPLACENCY OF THOSE WHO PREFER SAFE, PRDIGESTED, BUCCOLIC GENRE SCENES.



MY "C" FIRMLY ESTABLISHES ME ON THE CUTTING EDGE OF THE AVANT GARDE.



DON'T YOU HAVE TO WEAR SILLY CLOTHES THEN?



THE HARD PART FOR US AVANT-GARDE POST-MODERN ARTISTS IS DECIDING WHETHER OR NOT TO EMBRACE COMMERCIALISM.



DO WE ALLOW OUR WORK TO BE UPPED AND EXPLOITED BY A MARKET THAT'S SIMPLY HUNGRY FOR THE NEXT NEW THING? DO WE PARTICIPATE IN A SYSTEM THAT TURNS HIGH ART INTO LOW ART SO ITS BETTER SUITED FOR MASS CONSUMPTION?



OF COURSE. WHEN AN ARTIST GOES COMMERCIAL, HE MAKES A MOCKERY OF HIS STATUS AS AN OUTSIDER AND FREE THINKER. HE BUYS INTO THE CRASS AND SHALLOW VALUES ART SHOULD TRANSCEND. HE TRADES THE INTEGRITY OF HIS ART FOR RICHES AND FAME.



OH, WHAT THE HECK. I'LL DO IT.



THAT WASN'T SO HARD.



TODAY I DREW ANOTHER PICTURE IN MY "DINOSAURS IN ROCKET SHIPS" SERIES, AND MISS WORKWOOD THREATENED TO GIVE ME A BAD MARK IN HER GRADE BOOK IF I DIDN'T STOP!



THE ARTS ARE UNDER ATTACK! FREEDOM OF EXPRESSION IS BEING SMOULDERED!



THE AUTHORITIES ARE TRYING TO SILENCE ANY VIEW CONTRARY TO THEIR OWN.



WHAT DOES YOUR TEACHER OBJECT TO ABOUT DINOSAURS?



ANOTHER GORGEOUS, BRISK FALL DAY.



WHAT A WASTE TO BE GOING TO SCHOOL ON A MORNING LIKE THIS.



WHAT WOULD YOU DO IF YOU COULD STAY HOME THIS MORNING?



SLEEP RIGHT THROUGH IT.



DON'T SIT NEXT TO ME, CALVIN. I DON'T WANT TO HEAR ANY DISGUSTING COMMENTS ABOUT LUNCH.



RELAX. I WON'T TALK ABOUT LUNCH AT ALL.



INSTEAD, DO YOU WANT TO HEAR A RIDDLE I MADE UP?



WHAT'S THE DIFFERENCE BETWEEN A GARDEN SLUG AND A TWO-INCH LONG, LIVING BOOGER?



Mister Boffo

by Joe Martin



Far Side

by Gary Larson



The fate of Don King's great-great-grandfather



Far away, on a hillside, a very specialized breed of dog heard the cry of distress.



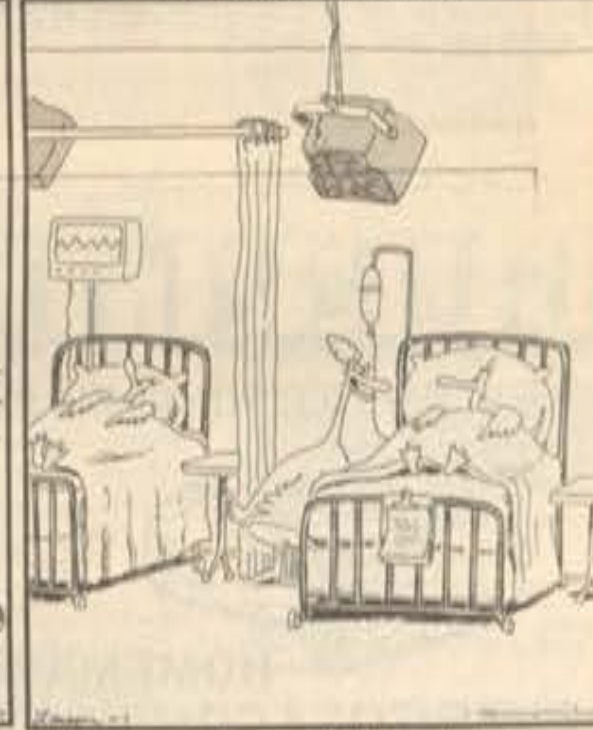
"You know, it's really dumb to keep this right next to the cereal. . . . In fact, I don't know why we even keep this stuff around in the first place."



"Well, if there's a bone stuck in your throat, you deserve it! . . . Do you see anyone else around here stupid enough to order fish?"



As the small band of hunter-gatherers sat around cleaning their weapons, one made the mistake of looking at his club straight on.



"It's just a miracle you pulled through, George. . . . Why, it was only a few hours ago the whole family was deliberating on whether or not to wring your neck."

Mother Goose and Grimm

by Mike Peters



Notices

Student Employees honored this week

The week of November 12-16 has been officially designated as Student Employment Week on the Daytona Beach Campus. During this time I want to express my personal thanks to all students who are employed both on and off campus for the great job they are doing.

Combining employment with academics demands energy, initiative and self-discipline; a challenging and difficult task by anyone's standards. But the accompany you throughout the rest of your adult life.

While your employment affords you opportunity to earn necessary income, your employers also benefit and enjoy sharing the new and progressive ideas you bring to them. Your employment allows you to develop a work history and to familiarize you with the working world that will help you in the future.

Again, accept my thanks for the great job you are doing and keep up the good work.

(This is from Kenneth L. Tallman, President, in appreciation to the students who are working at Embry-Riddle.)

Wright Brother's video tape now available

Embry-Riddle students and faculty have an opportunity to buy Paul Garber's series about the Wright Brothers' first flights at a special price. In this series, there is original footage taken from both the ground and the "cockpit." In addition, this series provides a biography and a history of the Wright brothers and the Wright Flyer.

The video tape series is 145 minutes (2 hours and 25 minutes) long and worth every cent of the price charged by the Smithsonian Institute. Moreover, this offer is made as a non-profit activity initiated by an ERAU student. The cost for this series depends on the response to this letter.

For Example: 102 orders-\$25.00 per copy, 203 orders-\$20.00 per copy, 304 orders-\$18.00 per copy.

The more copies we can order as a group, the cheaper the per unit cost.

If you are interested, please send your name, box number (or address), or some way to contact you in the event people want to own a copy of this unique series. My ERAU address is box 6752.

If enough people are interested, I will then ask for your money to buy the series from the Smithsonian Institute. Don't let this opportunity get past!

ATTENTION:

There will be an Experimental Aircraft Association dedication of the Wright Flyer this Friday, November 9.

Festivities will include the dedication, several experimental aircraft flybys and static display of these aircraft all starting at 3:30 p.m.

Autos for sale

1984 MAZDA B200 Truck runs perfect. body in good shape. \$2,350 or best offer. Call Ray 756-5784.

1977 HUIE C7-304 3 Speed \$1500 Call Jay 761-8978.

HONDA CB 1100F Runs good looks good. call 760-6417 for info. \$1000 O.B.O.

1981 BUICK REGAL, 67000 miles excellent condition. PWR Steering, power locks, PWR windows, AM/FM Radio, 2 doors. DRWN/Beige good tires. Asking \$1195 or best offer.

HONDA XL 600 1987 4,000 miles like new just legal! Asking \$1,600.00 call Joe 257-0021.

FOR SALE: 1978 Ford Fairmont 6 cyl A/T 4 dr. good tires some rust. asking \$500 call Jeff at 255-6674.

CAR FOR SALE: \$1600 Chevrolet Citation X-11, V-6, 2 dr., PS, PB, cruise, lth, AM/FM cassette, 70,000 miles, good tires, new brakes, runs fine. Call Chad 756-9238.

1984 LINCOLN MARK VII white with blue over top very, very, nice. \$6,600 Bob 252-9681.

Jaguar XJS with full ram 424 corvette engine with 400 turbo trans. automatic FLY LOW for 11,800 Bob 252-9681.

1983 GMC CUSTOM VAN all power plus fuel air \$1750 Bob 252-9681.

1979 VW RABBIT 2 Dr. very good mech. condition \$850 Bob 252-9681.

1981 HONDA CB 750F new, metalizer tires, new midnight blue paint, Vance and Hines Exhaust looks great call Rich 239-0334 \$350.

1987 BLACK SUBARU XT Turbo 4 wd. finest condition, new clutch and c.v.s, power everything 5 speed call 255-4767. \$7500. Ask for Ramiro.

1970 CHEVY STEP SIDE pick up wood bed. 307, 3 spd runs good, looks good. New tires, exhaust. Brakes 1 1/2 yrs. old. Call 253-7472 after 5:00.

Cycles for sale

1982 HONDA NIGHTHAWK 450. Includes helmet and cover. \$450 call 257-5749.

1983 CB1100, Honda very fast, looks good must sell \$1000 O.B.O.

Misc. for sale

KX-MAS IS COMING! Get her diamonds at a low price. 1/4 ct diamond pendant and 1/3 ct tw diamond stud earrings. Written appraisal at \$935.00 Asking \$635.00 Call David 676-0487.

5 cu. ft. refrigerator, never been used, \$75 OBO call Mr. Jim 760-760-1630.

FOR SALE: 2 plane tickets, 1 male, 1 female, one-way to Philly. leave Dec 20. Asking \$75 each call Mike 254-6988 or contact Box #6193.

SANYO CD player w/remote excellent cond. \$100 call Brian 760-8192.

FOR SALE: Texas Instrument TI-60, excellent condition! (2 yrs old) Have manual

HAVE 1975 C-150 (3400 T.T.) interested in selling 1/2 ownership. good radio's fresh annual. (Oct.) Also interested in running block time to PVT Pilot and up. Call Nick Motter 253-3969.

FOR SALE: weight bench with weights, \$50; beach cruiser, \$45; O.B.O. contact Matt at 253-4086 or Box 6767.

LOOKING TO BUY AN expensive PS/2 or a cheap made in Japan clone? Don't! I'm selling cheap, a Zenith at computer (made in U.S.A.) with a 286 CPU, 40 Meg Harddrive, both 3.5 and 5.25 inch floppies, a high resolution color monitor and a 1200 baud modem. Must sell! Act now and get a bonus gift worth many times the price of the computer. Contact Jose box 5466, or call 255-4941.

BOAT FOR SALE: 16ft Penn Yan with trailer. 120 HP Mercury IO and Mercury Stern Drive. Motor needs exhaust manifold to run perfect. Call for more details. Many extras. A deal at \$700.00 firm. Jim 255-7179.

TANDY 1000 SL 640K RAM DUAL 5 1/4 drives MS-DOS/BASIC and Desktop disks mouse and joystick included. \$800.00 (904) 253-7465.

FULL SIZE BED less than one year old for only \$80. Includes mattress, box spring and frame. Must sell soon!! Contact Amber 239-9464, leave message on machine, or box #6110.

HP 41 CX engineering calculator with advantage pad and all manuals. Asking \$125. Call 254-0761-leave message.

SURFBOARD: TOWN and COUNTRY 5'10" adjustable tri-fin, nose guard, bright colors, good shape. \$260-call 254-0761 or leave message.

WANT SOMETHING TO SLEEP ON!!! Queen Size mattress and box spring like new. 3 months old. \$85 call Jamey 252-6247. ERAU Box 4152.

FOR SALE 3 month old Pit Bull puppy. \$60. 255-8498.

FOR SALE****17' LASER SPEED BOAT 88 hp evinrude w/trim and tilt 10 hours * loaded* must see! 50 MPH Great for skiing. Call Paul 789-4358.

HANDGUN FOR SALE: 22 Cal Ruger MarkII-Target Grips-Extra Mag-Snap Mag. Release-carrying case-Like new-\$125.00 leave name and phone # in Box 5024 or call 677-5724 after 8 pm.

BRAND NEW GOLF CLUBS for men and women. Entire set (excluding putter) for less than \$250.00 Acrylic putters for \$50.00 or less. Other accessories available. Call Eric Roy at 252-9401 R. #359.

I'M STILL LOOKING FOR RIDERS for the trip home to Cincinnati. I will be leaving around Dec 13. I have plenty of space for 3 riders in my caravan. Box 8547 or call 252-4603. Ask for Chris.

\$99.00 WEEKEND ACCELERATED ground school-private pilot or instrument. \$49.00 refresher for rated pilots. Aircraft rental \$35/hr. Cessna 152. Call Toll free 1-426-0007 evenings.

WANTED: 19"-25" color T.V. w/remote. Must be cable ready. Small microwave oven. Small toaster-oven w/under the counter mounting. All items must be immediate! I'm very picky! I'm also looking for substantial deals. Also looking for free used bike frames. Neal 254-8406.

I'M LOOKING FOR A RIDE to Tampa Bay over T-giving. Let's split the Scotts. Would like to leave on Wednesday Nov. 24 contact Tim at Box #5358.

TENNIS LESSONS given by European circuit player. Reasonable rates. Call Tom #673-1473...NOW.

Personals

JENIFER
When the heat comes home. It will be out with the heat.

TODD

ORIG
I'm glad I listened to you. It turned out better than I thought!

JASON

GIET WELL SOON
I'm glad we could talk out our differences. You could never know how much you mean to me! Just don't string me along forever. Turkey week is my deadline. If it's going to happen it has to be before then. It's not that I want to put more pressure on you. It's just that I can only take so much more.

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