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Space Technology

B

Volume 67, Issue 6

October 17, 1990

Discovery returns home after successful mission

by Michael D. Fried
Space Technology Writer

The space shuttle *Discovery* ended its *Ulysses* probe mission with a successful landing last Wednesday at Edwards Air Force Base in California. The problem free mission has boosted the confidence of NASA and the American public after a troubled plagued summer.

The *Ulysses* probe is reported to be doing fine after deployment on mission day one. All subsystems are currently operating normally. The remaining experiments will be checked out within three to four weeks as the space craft goes through an in-orbit checkout.

The *Ulysses* probe is currently the fastest man-made object in the solar system, but once past the Jupiter sling shot effect, *Ulysses* will be going at a faster velocity of 40 kilometers per second.

This joint European Space Agency (ESA) and NASA project stands as a symbol of cooperation between the two agencies. This joint effort will pave the way towards future cooperation with the

space station *Freedom*.

A little known experiment that flew on the mission can be directly related to *Endeavour's* first flight. Samples of solar cells similar to the cells on the misplaced *Intelsat* satellite launched last March, are located on the remote arm in the cargo bay. After a week of exposure to space, the test will help NASA determine whether or not the cells have degraded to the point where the *Endeavour* rescue mission will not be flown.

Besides deploying the *Ulysses* probe, *Discovery* was part of a testing program which could one day lead to the return of Kennedy Space Center (KSC) landings. The braking test conducted on landing demonstrated the new carbon brake system. Commander Richards managed to decelerate his vehicle at nine feet per second, within the 8-10 feet per second margin defined before the mission. The landing marked the second time the braking system was used.

Captain Crippen, director of space flight, will make a decision on KSC landings in the spring. The

decision will be based on three criteria. The first being the carbon brake system which must complete its test program. The second is the new drag chutes which *Endeavour* will be equipped with. *Columbia* will be the second shuttle to have the new safety feature.

The last criteria is the critical weather decisions. The shuttle is committed to a landing site one hour before touchdown. The dynamic weather patterns that Florida portrays makes it difficult to ensure the weather will be ideal by the time the shuttle is on final approach.

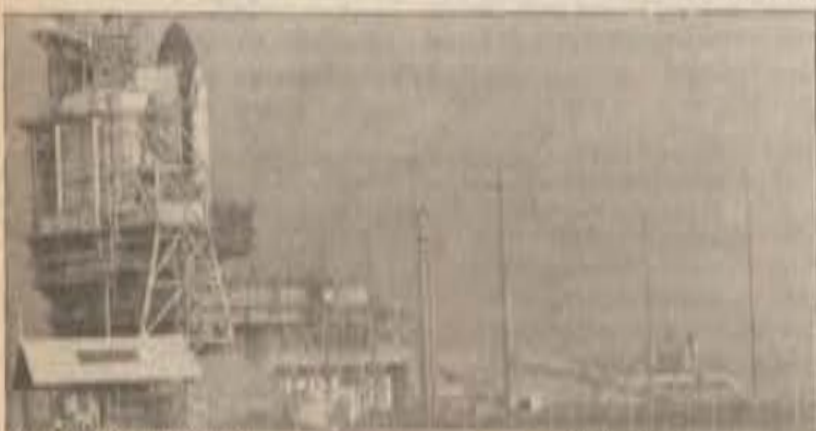
Provided all three criteria can be met successfully, Floridians may one day hear the sonic boom of the shuttle passing overhead. But for now we will have to settle for the shuttles flying overhead piggy back on top the NASA 747.

The *Discovery/747* combination landed at KSC Tuesday afternoon. The flight was originally planned for a one day flight, however, bad weather was encountered and the flight stayed overnight at Eglin Air Force, Florida.



We have touchdown...

Discovery was flown to the Kennedy Space Center yesterday after spending the night at Eglin Air Force Base. The NASA 747 will continue flying the shuttles from Edwards to the KSC until the carbon brakes and the drag chutes are completely tested.



Two to go please...

Space shuttle *Atlantis* can be seen in the foreground of the picture while *Columbia* is poised in the background. Both shuttles are being checked for fuel leaks in hopes of launching them before the year comes to an end.

Columbia and Atlantis are waiting for lift-off

by Jose L. Vazquez-Delgado Jr.
Space Technology Editor

Last weekend turned out to be a very busy weekend for NASA workers at the Kennedy Space Center (KSC). Space shuttles *Atlantis* and *Columbia* were rolled out to the launch pads in preparation for possible launches later this year.

Atlantis was rolled out Friday evening to pad 39-A where it went through validation tests of mechanical and electrical components. A tanking of the external tank will verify the existence of no leaks in the main propulsion system, scheduled for October

24. The Flight Readiness Review (FRR) is scheduled for October 29.

The STS-38 mission, *Atlantis*, will be dedicated to the Department of Defense (DOD) and has a launch target date sometime in November. A definite date will be set after a successful tanking test.

Columbia was rolled out on Saturday evening to pad 39-B. After going through the validation tests, workers worked on the main propulsion system. All six engine cover seals for the liquid hydrogen system and seals for the relief valves were replaced. The tank test will occur this Thursday. The

tanking tests for *Columbia* is scheduled for next October 29.

The payload bay doors of *Columbia* were opened Sunday night. The *Broad Band X-Ray* telescope, one of the telescopes of the *Astro-1* observatory, was serviced with argon. *Astro* is composed of three other telescopes, the *Hopkins Ultraviolet Telescope*, the *Wisconsin Ultraviolet Photo-Polarimeter Experiment*, and the *Ultraviolet Imaging Telescope*.

Mission STS-35, *Columbia*, will be dedicated to a single scientific discipline—astrophysics. Duration of the mission will be 10 days and might be

scheduled for December if all leak test are successful.

The *Astro-1* mission was originally scheduled for May 30, but the launch countdown was halted the night before due to high hydrogen concentrations monitored by sensors at the launch pad. The leaks were pinned down to the aft compartment.

After the six month grounding of the shuttle fleet, *Discovery* was launched with minor problems. It seems that NASA will have its hands full with two shuttles at the pads and hopes of launching them before this year is over.

Space News...

Vice-President to attend 28th Space Congress... Among the many featured speakers at the 28th Space Congress there will be many civilian and military leaders. Vice-President Dan Quayle, chair to the National Space Council in Washington, D.C., was invited to be the keynote speaker.

The theme for this years Space Congress is "Space Achievement: A Global Destiny" and will be held as always in Cocoa Beach, FL. The four-day event will take place next April 23-26.

Hubble Telescope observes comet... The Hubble Space Telescope observed the icy nucleus of Comet Levy on September 27. The image was taken by the Wide Field and Planetary Camera.

Comet Levy comes from the outermost confines of the Solar System. As revealed by the picture, the comet's solid nucleus body, only a few kilometers across, is unlikely to have been exposed previously to heating by the Sun. The picture shows mostly sun light reflected from the solid grains of cometary dust carried outward by gas expanding from the icy nucleus as it is warmed by the Sun.

Students make Space Station Proposals... Eleven national student winners in the 10th Annual Space Science Student Involvement Program (SSIP) were recognized at the National Space Science Symposium held on October 1-3 in Washington, D.C.

The SSIP is co-sponsored by the National Science Teachers Association (NSTA) and NASA in order to stimulate interest in science and technology by giving students the opportunity to work directly with aerospace projects. Over one million students participate each year.

This year eight students were selected winners for their space station proposals, one student for a moon base proposal, and two students for the news paper feature article award.

U.S./U.S.S.R. hold space meetings... Officials from the U.S. Government will be lead by Admiral Richard H. Truly on a visit to Moscow. This visit is in response to long-standing invitations to tour Soviet space installations and visit senior Soviet officials. The delegation will attend general discussions of U.S./U.S.S.R. civil space programs and visit space facilities during the week of October 15-19, 1990.

Meanwhile, the U.S./U.S.S.R. Solar System Exploration Joint Group (JWG) will hold their fourth meeting in Crystal City, Virginia on October 15-22, 1990. Also, a Soviet aeronautics team will visit NASA's aeronautics centers and will be briefed on our aeronautics programs during the week of October 15-25, 1990.

Among the places that the American delegation will visit are the U.S.S.R. Academy of Sciences, the Space Research Institute, the Flight Control Center in Kaliningrad and the cosmonaut training center—Star City.

The status of planned cooperation on the Mars Balloon relay mission will be discussed during the Solar System Exploration JWG along with the Antarctic Balloon Flight Program, the coordination of the Soviet Vesta (Mars '94), the U.S. Mars Observer missions and the exchange of scientific data. Also discussed will be the exchange of scientists on the Magellan, U.S. Mars Observer and Soviet Mars '94 missions with the possible cross-support of the Mars Observer and Mars '94 missions.

In turn, during October NASA will host a reciprocal visit by Soviet officials to the Ames Research Center in Mountain View, Calif., NASA's Dryden Flight Research Facility in Edwards, Calif., Langley Research Center in Hampton, Virginia, the Lewis Research Center in Cleveland, Ohio, and finally, NASA Headquarters in Washington D.C.

Space cooperation between the United States and the Soviet Union was established by the U.S./U.S.S.R. Civil Space Agreement which was signed April 1987. The exchange of visits during this week and the exchange of information between both countries will give both sides an opportunity to become acquainted with their ongoing aeronautical programs.

Are RTGs the alternative fuel of the future?

by Joshua S. Mussat
Space Technology Writer

Over the past two decades, American spacecrafts have travelled beyond the outer limits of the solar system, observing Mars, Jupiter, Saturn, Uranus and Neptune. Many missions, including the Galileo and Ulysses missions will last five to 10 years and will take the spacecrafts too far from the sun to rely on solar energy for power. To make these missions possible, the Department of Energy has provided a power source uniquely suitable for use in deep space, called a Radioisotope Thermoelectric Generator (RTG).

RTGs generate power by converting heat from the natural decay of plutonium-238 directly into electrical energy. The plutonium fuel is enclosed within multiple layers of special materials designed to protect and contain the fuel under normal or accidental conditions.

Design and structure of the RTGs

The two major elements of an RTG are: (1) a thermoelectric converter that converts heat into electricity and (2) a General Purpose Heat Source (GPMS) that contains the plutonium fuel. The RTG's converter does not use a fission process to create electricity; nuclear fission is not even possible because of the RTG's design. RTGs have no moving parts. They convert heat to electricity through a principle discovered in the early 1800's by Thomas Seebeck, when

materials are joined in a close circuit and the two junctions are kept at different temperatures, an electrical voltage is produced. Such pairs of junctions are called thermoelectric couples, or thermocouples. These thermocouples convert the heat generated from the natural radioactive decay of plutonium-238 dioxide into electricity.

The plutonium-238 dioxide fuel is heat pressed into ceramic pellets and encased in iridium metal. The encased pellets are referred to as fuel clads and are slightly smaller than golf balls. The GPMS contains these pellets in a stacked column of 18 individual modules, protected by three separate layers of materials. The outermost layer is called the aeroshell. Each aeroshell contains two graphite impact shells, and each graphite impact shell contains two fuel clads.

Safety test results

The safety test program includes tests of RTGs or RTG components (reentry modules or fuel capsules) for a range of possible accident environments. The accident environments that were simulated include:

Fire in a launch accident, could expose heat source modules to both solid and liquid propellant fires. Damage to modules components resulting from direct exposure to fire was minimal and no fuel simulant was released.

Earth impact GPMS modules are designed to survive impact following

modules (or maximum speed they can impact the Earth's surface due to the breaking effect of air friction) is about 120 mph. At this speed, impacts on sand, water or soil produce no releases. Impacts on rock or concrete sometimes produced releases, but much of the fuel was retained in the surrounding graphite module and only small amounts were free to move into the general environment.

Shrapnel Small fragments from launch vehicle explosions were simulated using aluminum and titanium bullets. Releases occurred only at speeds greater than the fastest velocities predicted for credible accidents. Based on these test results, shrapnel will not produce a fuel release.

Health effects on plutonium-238

The radiation produced by plutonium-238 is primarily in the form of alpha particles (helium atoms without their electrons) which must be taken into the body and irradiate living cells to cause harm.

In addition, because plutonium dioxide is a ceramic, it is highly insoluble in water and cannot easily travel through the environment and become incorporated into the food chain. Even if it is swallowed, plutonium dioxide particles will generally pass through the body harmlessly without being absorbed.

The major method in which plutonium-238 can enter the body is by being inhaled, absorbed by the

body for long periods of time. Only then can it become a long term hazard.

Why an RTG is used

The RTG is the only available power source capable of satisfying the power requirements of many planetary missions. Used as a sole power source, fuel cells or batteries would add weight to the spacecraft beyond current launch capabilities. Solar arrays are also incompatible with existing launch capabilities, and impose serious constraints on missions. For example, on the current Ulysses mission to the sun, the spacecraft must fly by Jupiter where the solar intensity is only four percent that of Earth. A solar array in excess of 500 square feet would be required. To integrate this array with the spacecraft, extensive spacecraft redesign, testing, significant supplemental funding and years of delay would be necessary. Using state-of-the-art array technology, the total spacecraft mass would be increased by 1,250 pounds. Once on its journey, the arrays' position on the spacecraft would obstruct the view of many spacecraft science instruments and severely compromise their mission return.

In comparison, an RTG is lightweight, compact, compatible with available launch vehicles, and operates independently of its proximity to the sun.

Prior use of RTGs

RTGs have been used successfully by the United States for about 30 years. Five RTG-powered Apollo Lunar Surface Experiment Packages were deployed by the astronauts and relayed information back to Earth on the physics and structure of the moon's surface. RTGs powered the twin Viking Landers that searched for life on Mars. The Pioneer 10 and 11 missions, still operating 19 years after launch, are also equipped with RTGs. The Voyager 1 and 2 grand tours of the outer planets, and the recently launched Galileo and Ulysses missions, all have been made possible by RTGs.

Overall

In total, RTGs have been used on 22 U.S. space missions. The use of Radioisotope Thermoelectric Generators has proven to be effective and their use will continue in the next century, in our never ending quest of understanding our solar system.

U.S. spacecraft involving nuclear power sources

Spacecraft	Launch date	Status
Apollo 12	14 Nov. 69	Station shut down
Apollo 13	11 Apr. 70	Mission aborted on way to moon Heat source fell in Pacific Ocean
Apollo 14	31 Jan. 71	Station shut down
Apollo 15	26 Jul. 71	Station shut down
Apollo 16	16 Apr. 72	Station shut down
Apollo 17	07 Dec. 72	Successfully placed on lunar surface
Galileo	17 Oct. 89	Successfully operating on flight to Jupiter
Ulysses	06 Oct. 90	Successfully operating on flight to Sun

Flag football standings announced

1.	Violators	4-0
2.	Sigma Chi	4-0
3.	Air Assault	3-0
4.	Team Dis	3-1
5.	Breakers	3-1
6.	Crimson Tide	3-1
7.	Hit Squad	3-1
8.	Demolition	3-1
9.	AFU	3-1
10.	Delta Chi	2-1
11.	AHP	2-1
12.	Ver's Club	2-1
13.	Hornets	2-1-1
14.	Wolfpack	2-1-1
15.	Penetrators	2-2
16.	Kawasaki	2-2
17.	Dead Ringers	2-2
18.	Droopy Dawgs	2-2
19.	Sigma Phi Delta	2-2
20.	Sigma Pi	1-2
21.	Eliminators	1-2
22.	Plague	1-2
23.	Beaver Bandits	1-2
24.	Resistors	1-2-1
25.	Scully Ally	1-2-1
26.	Gamecocks	1-2-1
27.	Cota Cats	1-3
28.	Lambda Chi	1-3
29.	Team #6	1-3
30.	Force	0-3-1



Work, work, work...

Hard work and practice are the keystones to success in the skillful sport of lacrosse. Jason Whitaker has applied these practices in excelling in the sport.

Athlete of the Week selected

by Todd Hughes
Sports Writer

This week's Athlete of the Week is a lacrosse player, Jason Whitaker. Jason is a junior in Aeronautical Science and is playing his second year for the Eagles. Jason has been playing lacrosse for five years.

Jason is an attackman and he had a very good game on Saturday against the University of Miami. Jason scored six goals and only missed on two shots. He also added an assist in leading the Eagles past the Hurricanes. When asked what it feels like to win Athlete of the Week, Jason replied "It feels great!"

"The only thing that would be better would be for the Eagles to finish first in the league."

"The only thing that would be better would be for the Eagles to finish first in the league."

This wish may not be far from what may actually happen. Last year, the team finished an amazing third place in their league.

Jason is excited about the upcoming season.

He states that the "team is very strong again" and that winning against the top schools in the state is "hard work, but we're up to it."

Come to the Eagles first home game and watch Jason Whitaker and the rest of the ERAU team in action.

Golf team heads to state championship

by Eric Atkins
Sports Writer

The Embry-Riddle Golf Team has been very busy lately, competing in two successive tournaments, and earning a place in the upcoming state championships in Tallahassee.

On Sunday, October 7, we began competing in the Stetson Intercollegiate Tournament, which lasted until Tuesday, October 9. Our top two players were both freshmen; Dan Afghani with a fifty-four hole total of 243, and Tommy Johnson with a 247.

We did very well considering that we were up against Division I and II schools such as Stetson, North Florida, Valdosta State and Columbus College. In fact, Embry-Riddle placed ahead of Division I Florida International, which is quite an accomplishment. This fine performance proved to be only a precursor to the outstanding exhibition of golf prowess demonstrated by the team this past weekend.

The Eagles, led by Freshmen Dan Afghani and Tommy Johnson, finished 10th of 17 teams in the Embry-Riddle-Palm Coast Intercollegiate Golf Tournament held at Palm Harbor Golf Club on October 13-15. Afghani finished with a 54 hole total of 235 which tied him for 13th place out of 85 golfers. Johnson was close behind with a 239 and team captain Paul Adam finished with a 241. Jim

Dryden and Jeff Bujnowski rounded out the Eagle squad.

This tournament was very important as five of the 17 teams were competing for the three consolation slots in the Florida State Intercollegiate Championship, to be held in Tallahassee in early November. The Eagles got a break early as Eckerd College, one of the five teams, did not show up for the tournament. Another remaining doubt was quickly dispelled when the team posted a four-man total. This put the team

The Eagles, led by Freshmen Dan Afghani and Tommy Johnson, finished 10th of 17 teams

stroked ahead of Barry University, 20 ahead of Flagler and 30 ahead of Florida A & M. The lead in Barry was lost in the afternoon, but the leads over the other two teams were increased to 47 and 66 respectively.

While eventually coming in behind Barry, the Eagles easily beat both A & M and Flagler to assure their trip to the state tournament.

As a result of their performance in the Palm Harbor Tournament, Afghani, Johnson and Adam have qualified for the state championship. The remaining three spaces on the team will be decided through qualifying over the next two weeks.

Watch for the next tournament against Flagler and Waycross, in Ft. Augustine on the 23rd and at the Riviera Country Club in Orono, Maine on the 24th.

Complete results of the Palm Harbor

Place	Team	First Round	Second Round	Third Round	Total
1.	Indian River C. C.	308	300	313	921
2.	Miami Dade North	312	310	307	929
3.	Florida Southern JV	312	310	310	932
4.	Rollins College	313	309	311	933
5.	Mercer University	305	312	316	933
6.	Barry University	317	308	317	933
7.	Nova University	313	315	316	944
8.	Stetson JV	320	317	316	952
9.	Georgia College	318	321	313	952
10.	Embry-Riddle	311	319	333	963
11.	Palm Beach JC	327	325	319	971
12.	Broward C. C.	330	325	319	974
13.	Valdosta College JV	333	334	317	984
14.	Midwestern State	325	323	338	986
15.	Florida A & M	341	336	331	1008
16.	Flagler College	340	356	348	1044
17.	Queens College	351	346	347	1044

Bentley is profiled

by Todd Hughes
Sports Writer

Each week there will be a player profile on a lacrosse player.

This week I have chosen Craig Bentley to profile. Craig plays mid-

field for the Eagles and reports the number four. He has been playing lacrosse for ten years.

Craig is a junior and has a 2.5 G.P.A. in Aeronautical Science. His future plans are to either work for Delta or United

lines where he would like to be captain of a Boeing 767. Craig was a very accomplished

player last season which was highlighted by his selection to the state All-Star team.

He was one of only three Eagles named to the team and he is the only one returning.

Craig's most memorable moment also comes from last season.

The Eagles were trailing Florida State University by four goals at F.S.U. and they came back to beat F.S.U. by two goals. Come and check out the Eagles and Craig

Craig Bentley

on the Saturday of homecoming and support the team at their first home game.



Things are looking up...

The basketball team has a scrimmage on Saturday, October 20. Coverage in the Avion will begin next week.

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Beech 1900D commuter airliner program on schedule

by Tami Strout
Aeronautica writer

The schedule for certification of Beech Aircraft Corporation's 1900D stand-up cabin 19 passenger regional airliner continues for early next year. Customer deliveries are scheduled to be ready in mid-1991.

Since the prototype 1900D's first flight last March, it has accumulated over 180 hours in more than 150 test flights. A structural test program which used a prototype test article, was started earlier this year. The program is proceeding well. A cycle test program which uses a different type of test article is also in progress.

The Beech 1900D was developed from the highly successful Beech 1900. It is a twin-engine turboprop airliner with a cabin 14 inches taller than the original 1900.

This increase in height provides a stand-up cabin for the majority of passengers and an additional 142 cubic feet of overall cabin volume. Due to the height increase, the aircraft now has a larger cabin entry door and a larger cargo door.

The 1900D will have improved climb performance and cruise with an increase in payload over the initial 1900. It is powered by Pratt and Whitney PT6A-67D engines unfolding 1,279 shaft horsepower each.

Throughout its optimum altitude range of 10,000 to 22,000 feet, preliminary performance figures indicate the 1900D will have a cruise speed in excess of 280 knots. Its maximum take off weight will be 16,950 pounds and its zero fuel weight will be 15,000 pounds.

The 1900D's hot day/high altitude performance is expected to surpass the current version of the 1900. The original 1900 has the best hot day/high altitude performance in its class.

This is a component which has made it favorable to pilots with routes over mountainous terrain.

The 1900D is being certified in the new commuter category under FAR part 23 for operation up to 25,000 feet. It is scheduled to replace the current 1900.

The first carrier slated to operate the 1900D is Mesa Airlines. They are a U.S. based regional carrier and a code-sharing partner with United Airlines. Mesa has declared its intent to acquire 25 of the new Beech airliners.

Other 1900D customers are expected to be announced before the first delivery next summer.

The 1900D is expected to be used by corporations with a need for high-density seating shuttle aircraft. This will be in addition to the aircrafts regional airline role and special mission operators.



Mesa has declared its intent to acquire 25 of the new Beech airliners.

Frequent flyer
The schedule for certification of Beech Aircraft Corporation's 1900D stand-up cabin 19 passenger regional airliner continues for early next year.

NTSB addresses wake turbulence problems

NTSB News Digest -- The National Transportation Safety Board has recommended that the Federal Aviation Administration revise current procedures providing safe separation, so that small aircraft can avoid wake turbulence from large aircraft taking off from or making a low approach to the same runway in the same direction.

The recommendation is the result of the Board's investigation of the November 9, 1988 non-fatal accident in Gainesville, Florida in which a Cessna 152 crashed after encountering wake vortex from a Lockheed P-3. The Cessna was cleared for takeoff 30 seconds after the P-3 made a low approach over the same runway. Upon reaching about 100 feet of altitude, the Cessna encountered the wake of the P-3 and crashed back onto the runway.

Under the existing departure separation turbulence criteria, the local controller acted properly and in accordance with procedures. The Board believes, however, that current procedures do not take into account the potential hazard of allowing a small aircraft (12,500 pounds or less

maximum takeoff weight) on a runway from which a pilot has executed a low approach in a large airplane (between 12,500 pounds and 300,000 pounds). In the Air Traffic Control Handbook, there are separation criteria for aircraft using opposite direction takeoffs or landings, but none specified for same direction takeoffs.

An FAA Advisory Circular and the Airman's Information Manual recommend a two-minute interval between passage of the large aircraft and the small, which is not consistent with the three-minute interval in the Handbook for the situations described earlier.

The Safety Board therefore recommends that the FAA: Amend its Air Traffic Control Handbook to require controllers to impose a 3-minute delay on the pilots of small aircraft departing in the same direction from the same runway behind large aircraft; amend the Airman's Information Manual to inform pilots of small aircraft that under certain circumstances they can expect to be held for three minutes before departing after a large aircraft has passed.



Noise maker...
The General Aviation Manufacturers Association (GAMA), told congress last month that airplane manufacturers strongly support a national noise policy. The main focus of the policy is older planes like this.

by Dan Moughamian
Aeronautica Writer

Stanley Greene, Vice President and General Counsel of the General Aviation Manufacturers Association (GAMA), told congress last month that airplane manufacturers strongly support a national noise policy. But they were concerned about any policy which might be arbitrary or overly simplistic in nature.

While speaking to congress

Greene said, "GAMA strongly supports the promulgation of a federal noise policy applicable to all public use airports and airplanes. It is essential that we develop a national noise policy which will balance growing public concerns about noise with the very real need to operate aircraft in the safest manner possible."

Greene then noted that even though both commercial and business jets are categorized into specific

decibels of noise under the same conditions. The human ear cannot tell the difference. Yet, under some proposals, the LearJet would be banned because it was built during the Stage one era."

The GAMA Vice President also cited the fact that many European nations are exempting aircraft which weigh less than 75,000 lbs. from airport restrictions because they realize

GAMA supports national noise control policy

stages, these are still not enough to categorize each aircraft's noise level. Greene continued by saying, "...one of our very first business jets, the Stage one, LearJet M23, makes 84.7 decibels of noise, while the very quiet, Stage three, MD-80 airliner makes 84.2

decibels of noise under the same conditions. The human ear cannot tell the difference. Yet, under some proposals, the LearJet would be banned because it was built during the Stage one era."

On a final note, Greene stated that despite the continuing efforts of manufacturers, today's technology probably will not result in further over-all noise reduction.

Mr. Greene concluded, "What is needed ... is a well funded, well coordinated national research effort to develop new noise reduction technology which could be introduced in the 21st century..."

The organization Stanley Greene works for (GAMA) is a national trade association based in Washington D.C., and represents 34 American manufacturers of general aviation aircraft, engines and avionics.

The members of GAMA also operate their own fleet of aircraft, based at various locations around the U.S.

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Calvin and Hobbes

by Bill Waterson

Far Side

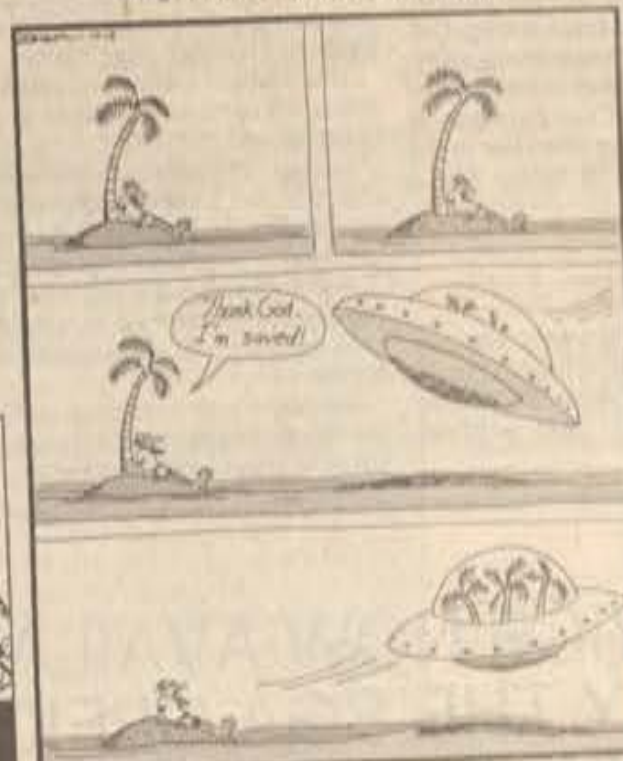
by Gary Larson



"Listen — I bought these here yesterday, and the dang things won't stop squeaking!"



"Dennis, do you mind if Mrs. Carlisle comes in and sees your rhino tube-farm?"



Llamas at home



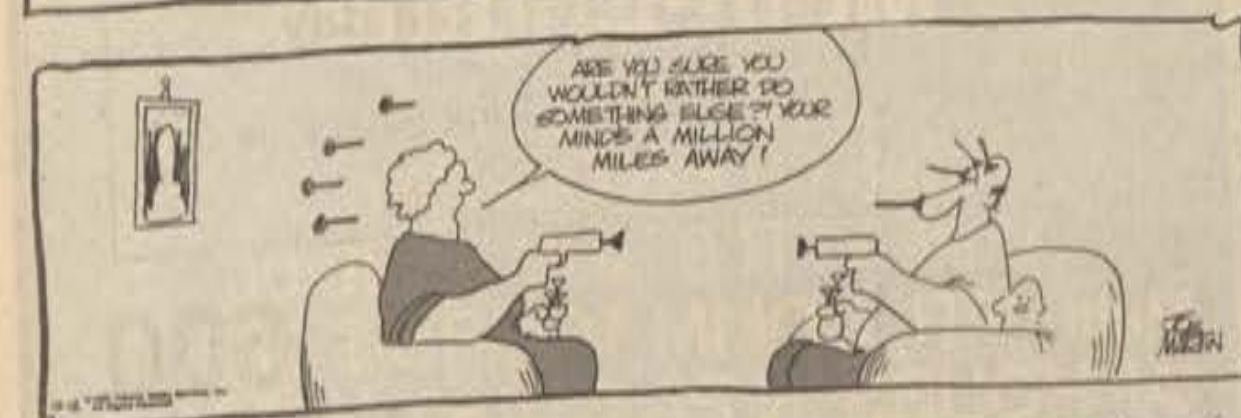
Hopeful parents



"Zak! Don't eat parsley! Just for looks!"

Mister Boffo

by Joe Martin



Mother Goose and Grimm

by Mike Peters



Notices

National Engineering Aptitude Search To Be Offered

Embry-Riddle Aeronautical University will offer the National Engineering Aptitude Search (NEAS) test November 17 from 9 a.m. until noon. The NEAS, sponsored by the Junior Engineering Technical Society (JETS) is a guidance-oriented examination available to help pre-college students determine their aptitudes for engineering, math, science, or technology studies.

Components of this three-hour exam include tests in mathematical understanding, scientific reading and comprehension, and problem solving, as well as an interest biography questionnaire.

Following the exam, students will receive guidance materials and a one-year subscription to the JETS Report newsletter. Comprehensive score reports and interpretive guides will be mailed directly to students' homes to assist parents, teachers, counselors and students in evaluating aptitudes for careers in engineering, mathematics, science, or technology.

Students interested in taking the NEAS should see their guidance counselors to register. The deadlines for registration are Oct. 12 for the November test and Dec. 14 for another test scheduled for Jan. 19, 1991. For more information contact Dean William Grams, College of Engineering and Aviation Science, at Embry-Riddle, 239-6634.

Counseling Center offers self hypnosis program

The Counseling Center is offering a five week group program on self hypnosis. The group will meet for 2 hours per week during Oct. 22-Nov. 19. Topics such as ego building, stress management, eliminating negative habits, improving study habits, solving problems and exploring you inner self will be addressed through self hypnosis. If you are interested, make an appointment for a short interview in the Counseling Center during the week of October 15-19. Group size is limited.

Safety Department hosts seminar

The Safety Department is sponsoring a personal safety seminar entitled "Prevention is The Key" on Oct. 25, 1990 at 1:30 p.m., in A-109. The seminar will be presented by Crime Services, an Atlanta based organization specializing in home security and personal safety. Everyone is invited to attend.

FAA Pilot Written Examination Schedules

Embry-Riddle Aeronautical University will administer FAA Pilot and/or Instructor Written Examinations for all pilot licenses, the (ATP 121) Airline Transport Pilot - Airplane, and (ATA 135) Airline Transport Pilot - Airplane.

The test dates are Oct. 20th, Saturday, at 9 a.m. in room G-105, in the GRW Complex and on Oct. 24 and 31, Wednesdays, at 9 a.m. in room H-115, in the GRW Complex.

Students intending to take an FAA Pilot Written Examination are required to sign up in Office H-119 or call extension 6830 prior to the examination day.

At the time of the examination, each student must present a receipt for the pilot exam fee, validated by the Cashier's office; a Written authorization form signed by an appropriate Aeronautical Science Ground Instructor, or the failed results of a previous FAA written examination, and present as personal identification an Airmen Certificate, driver's license, or other official document.

Explanations of appropriate forms and procedures will be given. Immediately thereafter, testing will commence and unless prior arrangements have been made, late examinees will not be permitted to enter the examining area while testing is in progress.

Entertainment tightens security

The following rules or regulations have been established and are now being enforced by the Entertainment Division of the SGA in regards to Thursday night movies.

The Student Center will close every Thursday night at 7 p.m. The doors will open for the movie at 8:25 p.m. or when the movie is ready to be shown.

Due to an agreement between Entertainment and Morrison's, the chairs in the Landing Strip and Flight Deck will remain in their respective areas in order to minimize breakage. In order to avoid the breaking of tables, people will not be allowed to sit on them.

In compliance with the local fire codes, the stairwells throughout the Student Center are to remain clear at all times. The film projector area (upstairs) is restricted to everyone except Entertainment personnel.

Repeated and excessive violation of the above rules will result in the discontinuation of the movies. These rules and regulations will become effective immediately!

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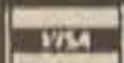
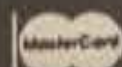
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1982 PONTIAC J2000II: 2 Door, sports edition, black, ice cold air, am/fm cassette, sport wheels, Good Year Eagle tires. Looks and runs great. \$1075.00 Dean at 257-4321.

1981 BUICK SKYLARK: 2 Door, white, air cond., automatic, power seating, power brakes, runs and looks great. \$1075.00 Dean 257-4321.

1982 PONTIAC J-2000: Black, tinted windows, rear 4 spd., crunched front fender, high miles, Alpine am/fm cassette. Reliable. \$500.00 or best offer. 756-2190. ask for Jeff or Box #2298.

1984 FORD ESCORT L: 2 Door with am/fm cassette, stereo, 4 spd., new tires, looks and runs great. Dean 257-4321.

1977 TRIUMPH SITTIFIRE: 47,000 original miles. \$2000.00 O.B.O., Call for details. Rich 257-2514.

78 CAMARO MUSCLE CAR: Not looking, 42,000 Actual miles \$2995.00. Call CJ's Auto Sales at 254-2886.

82 MUSTANG: 4 speed, a/c, sporty economy, \$2495.00. Call CJ's Auto Sales at 254-2886.

1984 FORD RANGIER PICK UP: 5 speed, sharp new paint, \$2695.00. Call CJ's Auto Sales at 254-2886.

1985 CHEVETTE: Automatic, a/c, \$2695.00, great gas saver. Call CJ's Auto Sales at 254-2886.

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→ Cycles for sale

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MUST SELL: 750 Sea 1981 Yamaha; runs great. \$1000.00 or best offer. Contact Coby: 756-7866.

88 NINJA 600R: Champagne red, 7500mi, excellent condition. \$3100.00 760-6245.

→ Misc. for sale

FOR SALE: Sony car am/fm compact disc player CDX-R79. Brand new, never been used, still in box. \$375.00. Call Mark 255-3786.

FOR SALE: VCR, Toshiba with remote \$150.00. Ask for Donny, tell him Matt told you to call 7760-8281.

HEWLETT-PACKARD CALCULATORS: At discount prices. All models available, brand new. Best prices in town. HP485X for \$260.00, HP285 for \$170.00. Contact Gustavo at 767-9612.

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FOR SALE: Mach 77 Boogie board by Morey Boogie Body Boards, \$45.00. 760-6264 ask for Dave.

FOR SALE: Apple II+ Computer with Panasonic printer. \$200.00. Call Matt at 760-8281.

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- Non-commercial classified advertising and personals are **free** to the student body, faculty and staff of Embry-Riddle with a 35 word limit.
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- Classified advertising is carried out by filling out a classified ad card in the *Avion* office.
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LARGE BEDROOM, cable TV, microwave, washer/dryer. Furnished with double bed, desk, dresser; sofa, large closet. Residential house. 10 minutes from campus \$200 month, \$150 deposit, 1/3 utilities. Bob 761-5828.

→ Personals

THUMPER Queen to Knight's bishop #6.2.2. Try a run in the rain, does wonders for your morning. ELITA

WELCOME TO EMBRY-RIDDLE

Ladies and gentlemen, on the right is the beautiful Spruance Hall and coming up on the left is an almost exact replica of the famous Wright flyer. (Please over look those poor people with books.) Tomorrow's attraction - Disney World!

RV

Hope you enjoyed your stay in PRC. It was great to meet you. Sorry you had to leave so soon. Thanks for a great time. ML.

TO CONCERNED PILOT

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HAPPY BIRTHDAY to me.

FROM THE MENTALLY ILL. SNOWBOARDER

TO ANYONE KNOWING THE WHEREABOUTS of 2 ERAU

Immobilizers stolen off my Blue Ford truck on Wed. Sept. 26, since I am the prime suspect it would be nice if the person responsible would please turn him or herself in to security. If anyone has any information concerning this please notify either security OR myself at ERAU box 2102 or 788 Jimmy Ann Dr. #1611 Phone #253-9607. Any information will be held confidential or can be anonymous.

DANETTE

OH NO! It's back to get us. I can't take it anymore. FELLOW SUPPERER

HOWARD

Either you or the TV goes! Have you ever seen a TV implode?!

GRANT

YELLOW BUTTON WONDERERS:

To all the people who said that the yellow buttons support the fact that our forces are in Saudi Arabia: It was not meant as a political stance, the SGA merely wanted to show support for our servicemen who are over there.

SRB REPRESENTATIVE

J. SCHWARTZ

Stop being such a nudge.

THE CHAIR

MOM

Thanks for the cookout, YOUR WING P.S. No more hot air balloons, I promise, really...

JAAP

Roses are red,
Violets are blue;
Get a life!
MK & JS

TO ALL:

Life is like a toilet,
You start out all fresh and clean;
then you get all this crap dumped on you,
and just when you've cleaned up your act,
you get flushed.

DAVID PETER F.

Own up to your responsibilities. US

SB

You turn's up for these. When do I get mine? NO

Diet Diet Diet!

MONTY,

Thanks for the tab.
GET WILL SOON

THE BITE,

You're really something, now get the sucker out of them.

THE BITTEN

TO ALL WORTHLESS STAFF

Make it Vertical! Dammit!!!!!! PHOTO GOD

HERMAN

mythoughtsarerunningaroundandaroundandaroundandaroundandyouknowwhattheyareall aboutluckyyou MARTHA

KRESS

hi THE MENTALLY ILL SNOWBOARDER

SALICA,

One of these days I'm going to cut you into little pieces.

THE GENERAL.

TO ALL,

Pray for the Broadcast Club. I'd take a miracle for them to get a radio station here. DR

LUMBERJACK,

I always wanted to be a lumberjack. Sing. I'm a lumberjack and I'm O.K. I sleep all night and work all day. WODDY

BDM

I want you bad bad.

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