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Embry-Riddle Aeronautical University

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AERONAUTICA

F-16XL conducts laminar flow research at mach speed

Frances L. Cozza
 Aeronautica Writer

NASA Ames Research Center is testing two F-16XL aircraft to help improve laminar airflow at sustained supersonic speeds. This will be the first program to look at laminar flow at speeds faster than sound.

The data attained will be available for the development of future high speed aircraft, including commercial transports. The unique delta wing design on the F-16XL will probably be used on future supersonic cruise aircraft.

A certain amount of air turbulence occurs on the surface of most aircraft wings, regardless of shape and size. Because of its viscosity, as air moves across an airfoil, it changes from a laminar (smooth) flow at the forward area to a more turbulent flow toward the trailing edge.

The "perfect" wing would demonstrate laminar air flow across the entire surface of the wing, with no turbulence. This thin turbulent layer affects flying performance by increasing aerodynamic drag and fuel consumption.

...the F-16XL two seater will be modified with a different experimental wing...

sumption.

Research conducted on most laminar flow is carried out in two types of experimental devices—active and passive—that are attached to the research aircraft wing. These devices are commonly called "gloves."

The first phase of the flight test will examine the performance of an active experimental wing section, which is made of titanium skin, is placed on the upper surface of the left wing of the single-seat XL.

The active test consists of tiny holes through which most of the turbulent air is siphoned off by an internal suction system built into the wing. This decreases drag and enhances aerodynamic lift by either eliminating the turbulent layer of air or reducing its effect.

The passive experimental devices attach to or become a part of the research aircraft's wing, but do not use a suction system to remove the turbulent air. Through careful contouring of the wing's surface, some laminar flow can be achieved naturally.

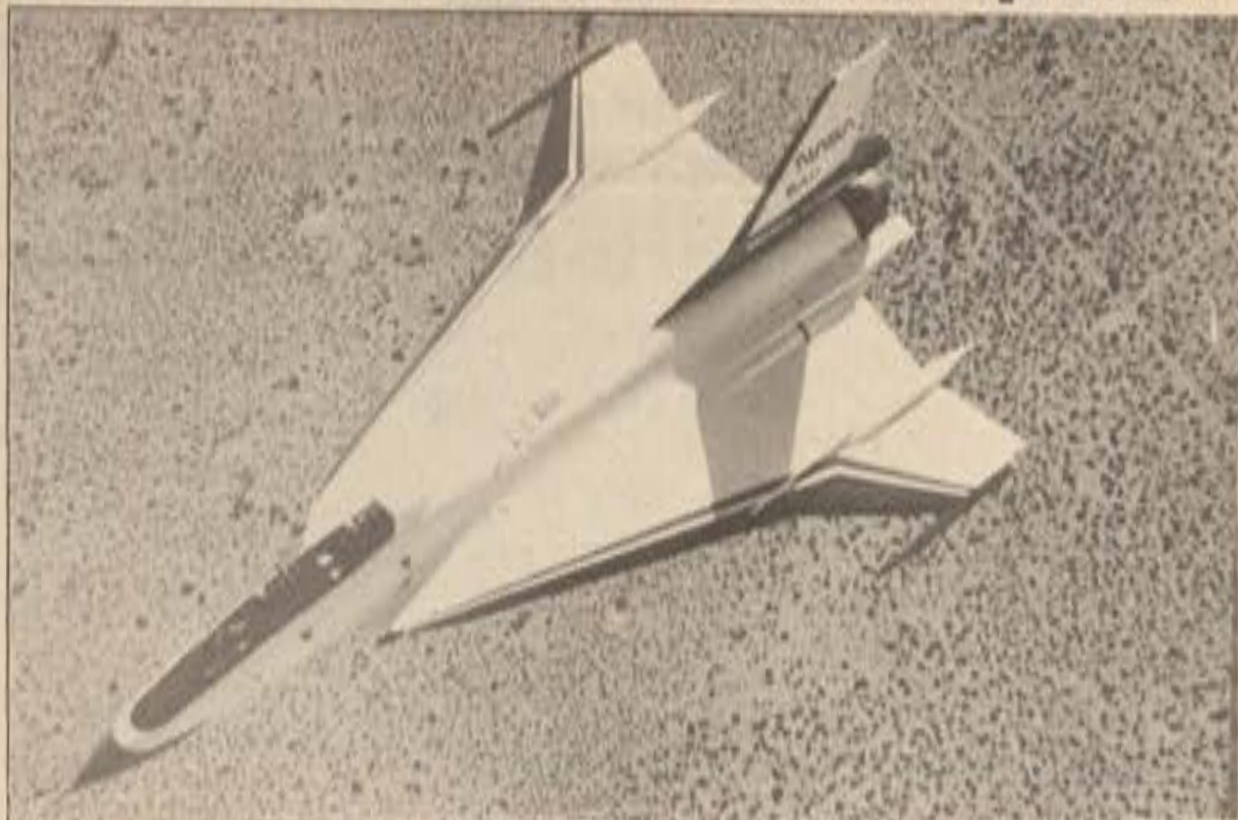
The second phase will use the F-16XL two seater and will be modified with a different experimental wing surface designed by NASA's Langley Research Center, Hampton, Va. Though the second phase will be without a suction system, it will be added later on to the leading edge and other wing surfaces.

Both types of laminar flow devices obtain data from sensors and other forms of instrumentation built into or attached to the wing to measure airflow, density, and pressures.

Data produced by instrumentation monitoring airflow over and around the glove is being analyzed and compared with computational fluid dynamics models in the supersonic flight regime and are expected to validate computer codes and aid in the design of future high-speed civil transports and high performance military aircraft.

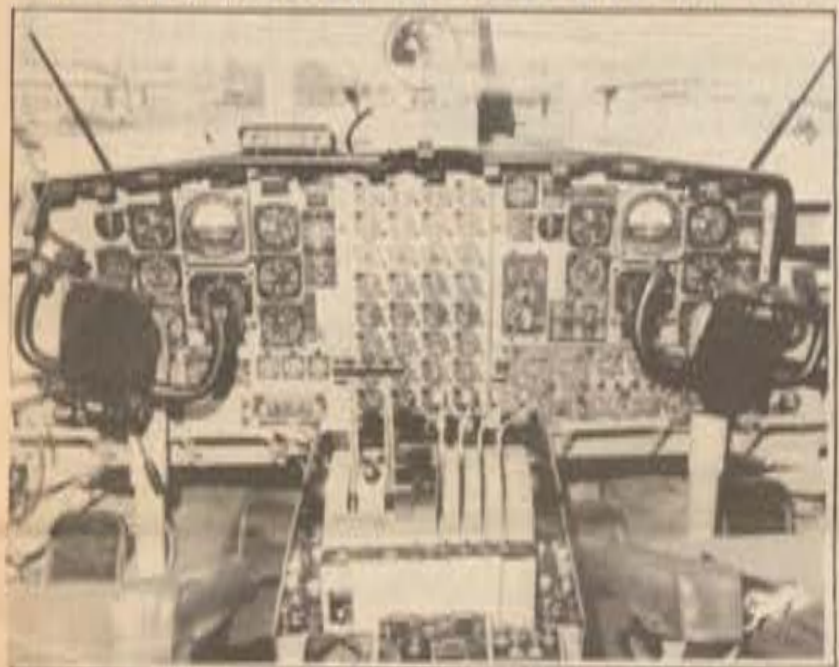
Dryden has conducted laminar flow studies in the past years with F-14, F-15, and F-111 high performance aircraft, and also with a JetStar business-type aircraft.

Phase two flights are expected to begin in the fall of 1991 and continue into Fiscal Year 1996.



Getting Laminar...
 NASA F-16XL number 2 is used to investigate laminar flow at supersonic airspeeds to help improve the design for civil transports and high performance military aircraft.

Lockheed uses new electronic technology in Hercules cockpit design



Before and after...
 On the left is a Lockheed C-130 cockpit with 60 round gauges, on the right is the cockpit with flat panel displays.



Frances L. Cozza
 Aeronautica Writer

Lockheed Aeronautical Systems Company (LASC) has enhanced their C-130 cockpit design. With more than six equipment suppliers and government assistants, the 60 electromechanical cockpit instruments will be replaced by a six digital LCD flat panel displays.

The systems, using color Active-Matrix Liquid Crystal Display (AM-LCD), manufactured by Litton, displays present flight attitude, navigation, weather radar and engine operating data on its screens. It is the first installation of this type tested on a military transport.

According to Ray Frewer, C-130/L100 Program Engineering Manager for LASC, the AM-LCD displays are called flat panel due to their

reduced depth. "These units require only one fourth of the depth required by television type Cathode Ray Tubes (CRT) in operation on some of the newer commercial aircraft. Being shorter than CRTs, the LCD units are easier to install in the limited space behind an aircraft instrument panel. Digital processing, reduced electrical power, reduced weight and cooling requirements, as well as durability, are added benefits of this kind of technology."

It is the first installation of this type tested on a military transport...

Under contract with the U.S. Air Force, LASC developed the electronic cockpit using AM-LCD technology as a possible future enhancement to reliability and maintainability for the C-130. Testing of the Hercules glass instruments will continue over the next eight months.

Flarecraft flies fast feet above the water

Petros Fikiorkis
 Aeronautica Writer

If you cannot pass your FAA pilot test, but still want to fly legitimately, there is some hope for you with the Flarecraft. However the Flarecraft was not created to accommodate those who cannot acquire FAA flying credentials.

The Flarecraft was unveiled to the public at the 50th Miami International Boat Show which took place the week of Feb. 16 through 20.

The Flarecraft is not a plane, boat, hovercraft, or hydroplano. It is a ground effects vehicle. It looks like a small plane blended on a trimaran boat.

It taxis on the water as an amphibious plane does, it hydroplanes between 15 and 40

mph, and takes off at approximately 42 mph in ground effect, then it cruises a few feet above the water at speed up to 75 mph.

The Flarecraft is powered by a BMW engine with a small ducted propeller providing thrust. The Flarecraft cannot fly on its own, but flies with the help of the air trapped between it undersurface and the water. This gives an increased lift to drag ratio close to

The Flarecraft is powered by a BMW engine ...

500%. This is because induced drag is decreased by as much as 70% since a wing in ground effect suppresses drag with the

downwash induced by wing lift. As a result weight efficiency is increased dramatically. It requires very little power to fly and that translates in great fuel economy, about three gallons per hour, cruising at 75 mph.

The Flarecraft is inherently stable and very maneuverable, there is no stick but rather a conventional wheel. You do not need to pull back on the wheel to get off the water, just increase power and the Flarecraft will climb above the surface and remain in ground effect.

Flarecraft is the name of the Connecticut company that markets the craft in the U.S., but it is built in Germany by Rhein-Flugzeugbau GmbH a subsidiary of Messerschmitt Bolkow Blohm (MBB).

The concept is not new and originated in Finland back in the 1930's but the current design is mainly due to the work of the late Dr. Alexander Lippisch. The majority of research and development of wing in ground effect vehicles has taken place in Germany. Similar vehicles have been developed and are operational in the Soviet Union.



Flarecraft flies low...
 The Flarecraft is not a boat or a plane but a ground effect vehicle that rides on a cushion of air from its wings.

African-Americans neglected in aviation industry

Erlinn Moore
 Aeronautica Writer

The concept of soaring through the wild blue yonder with just you and the heavens is a dream as old as time. Both men and women have achieved this long time dream and made it a reality. Today both men and women fly aircraft in general aviation and commercial aviation fulfilling their dreams and providing an essential service to the public as well.

However, many groups of men and women haven't been able to achieve this dream or obtaining supporting positions because of discrimination and/or lack of positive role models.

One segment of society which hasn't made much of a dent in the airline industry is African-Americans. They make up 12% of the population, yet they hold less than half of 1 percent of all pilots at major carriers.

Blacks have made significant achievements in most aspects of society yet they seem to have difficulty or lack of interest in attaining positions in the airline industry.

The House Government Operations Transportation Subcommittee held hearings in 1988 on this issue. The report, based on 1986 data, showed

airlines employed more than 45,000 pilots, and that only about 200 were black. Although, this type of a statistic is shocking to some people, the airlines seem to feel that much needs to be done but they don't see a part in promoting aviation to the different segments of society who can benefit in such careers. They leave the promoting up to the flight schools and other organizations.

One such organization is Embry-Riddle Aeronautical University. A relatively, industry known university who has the reputation of placing the best pilots and supporting positions in the industry.

After an informal investigation in the admissions practices and career placement of the university, and various discussions with administration officials on this topic, I found that the university does not have a formal or informal program to attract minorities and women to the university.

They solicit potential students basically through mail correspondence from high school SAT/ACT test scores and direct requests for information on the school code section of such tests. This leaves a very narrow

variety of students from which to choose.

According to the fall 1990 student fact sheet there are approximately 219 black students at the Embry-Riddle Daytona Beach campus out of 4,975 students; this equates to 4.5%. This statistic may not mean anything to some but to others it provides interesting questions: Is the university doing a good job in recruiting blacks to the university? Does it mean anything that the national demographic in

population are changing and the school should try to attract more blacks? With the airline industry in turmoil should the university be trying to promote more blacks in the university?

One pilot's organization is asking that very question. The Organization of Black Airline Pilots is not asking for changes in job qualifications, it is asking the industry to do more to encourage young black people to begin the long training process for pilots.

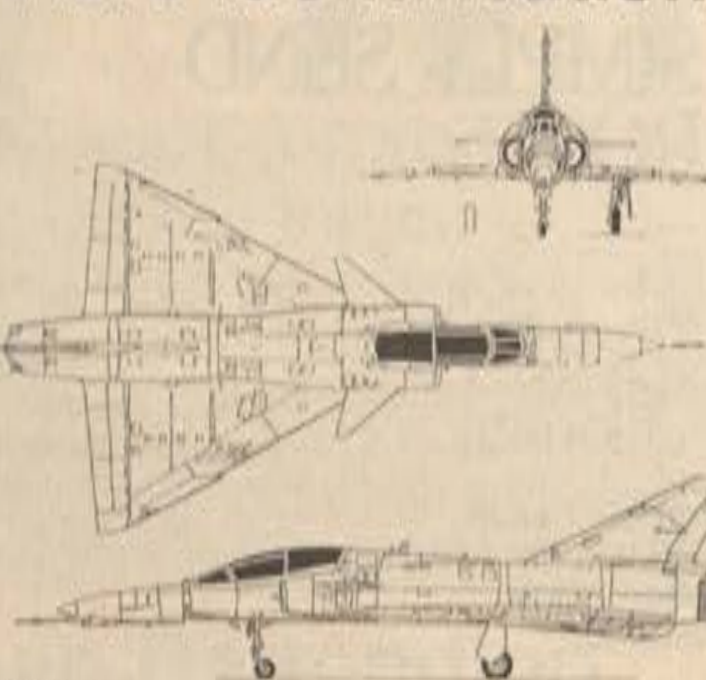
Blacks in the Airline Industry

Percentage of blacks in each job category, as defined by the Equal Employment Opportunity Commission.

White-collar jobs	
Managers	5.3%
Professionals	2.0%
Technicians	6.8%
Sales/Marketing	13.0%
Clerical workers	11.8%
Blue-collar jobs	
Craft workers	7.5%
Operatives	17.5%
Laborers	25.9%
Service workers	11.4%

Source: Equal Employment Opportunity Commission, 1989 ORO-1 Report

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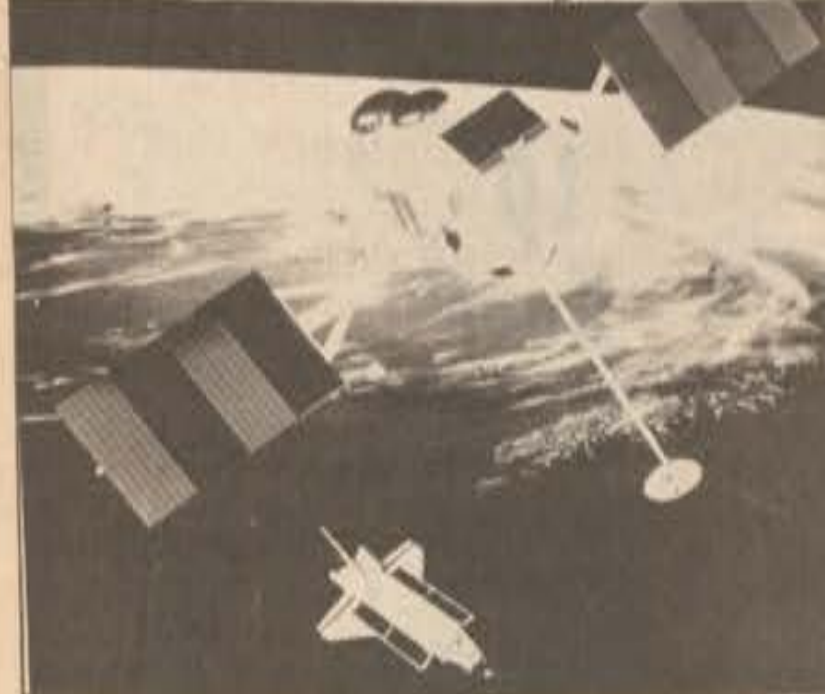


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Gamma Ray Observatory to take a look back in time



The second great observatory...
The Gamma Ray Observatory will be taken into space in early April aboard the Space Shuttle *Atlantis*.

by Brian D. Marcheseault
Space Technology Writer

The Space Shuttle *Atlantis* is scheduled to carry the Gamma Ray Observatory (GRO) aloft in just a few weeks. The April mission, STS-37, is to open a new window on the universe with GRO, even looking back to the very beginnings of time.

As the spacecraft's name implies, gamma rays are the focus of this observatory. Gamma rays are the shortest wavelength and highest energy electromagnetic rays. They are emitted by intergalactic sources like pulsars, supernovas and quasars. The effects of black holes also may be seen using gamma rays.

A particularly fascinating aspect of the Gamma Ray Observatory is its ability to look back in time. Gamma rays allow scientists to examine the dynamics and evolution of stars, galaxies and the universe itself. GRO will permit the close observation of changes taking place at immense distances. In terms of space and light years, these vast distances translate to a glimpse of mil-

lions of years back in time, even towards the Big Bang.

Other intriguing objects in the universe to be studied by GRO include novae and supernovas, which are extremely powerful explosions of stars. Very dense, collapsed remnants of stars, called neutron stars, and their rotating versions, pulsars, will also be examined further.

The universe's most energetic objects, quasars, and the effects of what are believed to be black holes will be allowed to be more closely studied by GRO as well.

NASA's "Great Observatory" series will be continued with the launch of GRO. Future observatories planned are the Space Infrared Telescope Facility and the Advanced X-ray Astrophysics Facility. The first of the series placed into orbit was the infamous Hubble Space Telescope. Despite its optical problems, Hubble has already produced images of greater quality than even anticipated. However, all of GRO's instruments have been carefully prechecked on the

ground to avoid the fate that befell Hubble.

The Gamma Ray Observatory's instrument package includes four separate units. The Burst and Transient Source Experiment is to continuously monitor large portions of the sky for irregular bursts of gamma rays. Black holes, novae, pulsars, and other such phenomenon will be studied more intensely by the Oriented Scintillation Experiment. The Imaging Compton Telescope and Energetic Gamma Ray Experiment Telescope will study vast fields of images and exceptionally strong sources, respectively.

The observatory will be setting a number of records in that it will be the heaviest unmanned spacecraft launched by NASA and the heaviest payload ever delivered by a space shuttle. GRO will be deployed at an altitude of 280 miles in order to avoid the effects of the Earth's magnetic field. A unique design aspect of GRO is that it has a refuelable propulsion system to be serviced at an altitude of 195 miles.

The Gamma Ray Observatory is a landmark in man's quest to look at, and eventually reach the stars. It is anticipated that a minimum two year operation is sure to produce the most incredible information about the origins and mysteries of the universe ever conceived.

A particularly fascinating aspect of the Gamma Ray Observatory is its ability to look back in time...to examine the dynamics and evolution of stars...

Venusian features to be named by the public

by Joshua S. Mussat
Space Technology Editor

Scientists of NASA's Magellan Project, in association with the U.S. Geological Survey, are inviting the public to propose names of notable women for the many impact craters and large volcanic vents being discovered on Venus by the Magellan spacecraft's imaging radar.

"We want everyone, especially students, to share in the adventure of discovery," said Magellan Project Scientist Dr. Steve Saunders. He said that the impact craters on Venus are some of the most beautiful features in the solar system. They form somewhat randomly in time and space when an asteroid or very large comet collides with Venus' surface.

"The flower-like symmetry of impact craters evidences the enormous energy of these infrequent events," he said. "A modest 20-mile-diameter

crater represents more energy than is contained in all the arsenals on Earth."

Names sent to the Magellan Project offices at NASA's Jet Propulsion Laboratory will be compiled for the Working Group for Planetary System Nomenclature, a committee of the International Astronomical Union (IAU). The IAU gives final approval to names for bodies in the solar system.

Because the IAU meets only every 3 years and its next meeting is in July 1991, names newly proposed for Venusian features will not be considered until the following meeting in 1994. But names proposed this year, if accepted as provisional by the nomenclature committee, may be used on published maps and in articles, pending final approval by the IAU.

"The mapping of Venus is unique in the history of cartography," said

USGS cartographers Ray Batson and Joel Russell. "Never has so much territory been discovered and mapped in so short a period of time."

"The process of naming features on Venus began in the 1980s with early radar images taken from Earth. It continued through radar mapping spacecraft expeditions of the United States and Soviet Union.

But, they said, the Magellan mission is resolving features 25 times smaller than those mapped previously and its radar data will cover an area nearly equivalent to that of the continents and the ocean floors on Earth.

Many features on Venus, by international agreement, are named for goddesses of ancient religions and cultures. But craters and volcanic calderas, vents, the paterae, are named for actual women.

There are certain stipulations, however. For example, women must have been deceased for at least 3 years and

must have been in some way notable or worthy of the honor.

Names of military or political figures of the 19th and 20th Centuries are specifically forbidden under rules of the IAU, as are the names of persons prominent in any of the six main living religions. Names of a specific national significance also are not allowed.

When the name is submitted, her birth and death years and a one or two sentence written rationale for the honor should be given, along with a reference book citation, if available.

The Magellan project members ask that submissions be sent to:
Venus Names
Magellan Project Office
Mail Stop 230-201
Jet Propulsion Laboratory
4800 Oak Grove Dr.
Pasadena, California 91109.

The process of naming features on Venus began in the 1980s with early radar images taken from Earth.

Orbiter Update

ATLANTIS...The Terminal Countdown Demonstration Test began at 8 a.m. on Tuesday, and will conclude at T-0 at 11 a.m. today. Interface verification tests between the orbiter and the Gamma Ray Observatory payload is now in progress. Also, plans to inspect orbiter components in the aft compartment due to the water intrusion is in work.

Upcoming events in the STS-37 countdown are the Launch Readiness Review, March 21, and the Flight Readiness Review on March 26-27, after which, a launch date will be set.

Atlantis is scheduled to be launched during the first week in April with the Gamma Ray Observatory and the first extra-vehicular activity since the return to flight in 1988.

DISCOVERY...The space shuttle *Discovery* is in OPF bay 2 undergoing replacement of the external tank door hinge housing with modified beefed up housings and cycling of the doors to retest them. Also, thermal protection system operations are in progress.

The vehicle is scheduled to be rolled back to the Vehicle Assembly Building early next week.

Discovery is now scheduled to be launched in later April or early May on an unclassified Department of Defense mission.

COLUMBIA...The orbiter *Columbia* is in OPF bay 1 undergoing routine maintenance between flights. Work in progress includes: testing connections for the payload; installation of the space shuttle main engines; tests of the power reactant storage and distribution system; and orbiter maneuvering system pod functional test.

This weekend, the Spacelab Life Sciences payload will be installed into the cargo bay.

Columbia is scheduled to be launched in May with the Spacelab Life Sciences 1 payload.

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Calvin and Hobbes by Bill Waterson

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Far Side by Gary Larson

"Don't worry, Jimmy — they're just actors ... and that's not real ketchup."

"The fuel light's on, Frank! We're all going to die! ... Wait, wait, ... Oh, my mistake — that's the intercom light."

"Shoot! Sounds like Little Kid's approaching — Well, no rest for the wicked."

"Ticks, fleas ... Ticks, fleas ..."

"Well, what d'ya know! ... I'm a follower, too!"

"Listen, Morrison! ... It's OK — those are jungle triangles!"

Mister Boffo by Joe Martin

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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.

Ground training computer testing available

ERAU is now giving ground training final exams for the private, commercial, and instrument flight courses by computer. Students completing the final exam by computer will be graduated under ERAU written self-examining authority and will not be required to take an FAA Written exam. Anyone already having passed an FAA Written will not be able to substitute it for the computer exam.

The computer testing lab is in "H" building and is outfitted to test seven-teen students at a time. The tests will be given Monday through Thursday 0830 to 1630 (completed by 1630). There will be no testing on Fridays. Students have the option of signing up in person with the Flight Records Office (H-119), or by calling ext. 6828. The appropriate test must be taken within 7 testing days of the last ground lab class to prevent flight course delays.

Mandatory meeting notice for seniors loans

If you were awarded student loans as part of your financial aid package while in attendance at Embry-Riddle, Federal Regulations require that you complete an Exit Interview prior to leaving the University. For those students who received monies from the Stafford/GSL programs ONLY, a separate Exit Interview session will be scheduled through the Financial

Aid Office. Further information will be provided at a later date for these students, or you may call the Financial Aid Office for further details. However, if you are a recipient of the Perkins/NDSL or REAL loan programs alone or in conjunction with a Stafford/GSL, you are required to complete the EXIT INTERVIEW conducted by the University Collections office.

The EXIT INTERVIEW provides you with important information concerning repayment terms regarding these loan programs. It is especially important that you complete an EXIT INTERVIEW if you are a borrower from multiple loan programs where the loan program terms and provisions differ from one another. It will be necessary for you to know in advance how entering into "multiple loan repayment" will affect you.

Please contact the University Collections Office at 239-6040 to schedule your appointment for an EXIT INTERVIEW.

Schedule For Current Semester Meetings:

DATE/TIME	DATE/TIME
Monday, March 18 3:30 p.m.	
Tuesday, March 19 8:30 a.m.	
Wednesday, March 20 3:30 p.m.	
Thursday, March 21 11:00 a.m.	
Friday, March 22 3:30 a.m.	

All above sessions will be held in the John Paul Riddle Student Center (located at the main entrance of the University Center).

Letters

(continued from page A2)

The new grading proposal creates an incentive to not only work up to your potential, but to be an overachiever.

Why should the weak student at a given grade level be given credit not earned, while the strong student in that same grade level is kicked in the teeth?

The new grading proposal neither giveth nor taketh away credit

earned, and so is fair to ALL students.

Mention is made of recruiters having a problem with the new proposed scale. The University of Illinois says that an A = 5 points, B = 4 points, etc. Western Mich. U. has grade levels between the letter grades A, B, C as AB = 3.5, BC = 2.5. Recruiters have probably seen all different kinds of grading systems and so, C.D. would figure out

ACROSS

- 1 Algonquian Indian
- 4 Rent
- 9 Spread for drying
- 12 Couple
- 13 Talk idly
- 14 Guido's second note
- 15 Roman bronze
- 16 Vast ages
- 17 Track
- 18 Subject of discourse
- 20 As far as
- 21 Myself
- 23 Trouble
- 24 Fear
- 28 Unit of Siamese currency
- 30 Choices
- 32 Platform

DOWN

- 2 Veneration
- 3 Expense
- 4 Hurries
- 5 Advancement
- 6 Path
- 7 Possessive pronoun
- 8 Symbol for tellurium
- 9 Kind of class
- 10 Bitter root
- 11 River in Scotland
- 17 Harsh
- 18 Exclamation
- 20 Measure of weight
- 21 Title of respect
- 22 Babylonian hero
- 24 Growing without
- 25 Farm implement
- 26 Sufferer from Hansen's disease
- 27 Ancient chariot
- 29 Row
- 31 Rodent
- 32 Range of view
- 37 Female deer
- 38 Thinly scattered
- 42 Article
- 45 Chair
- 46 Taint
- 47 Carve
- 48 Room in haven
- 49 Encountered
- 50 Ocean
- 52 Garden tool
- 53 Individual
- 55 Multimeter abbr.



The Weekly Crossword Puzzle

the new scale just as quickly as you did.

In closing, I would like to say that when the new grading proposal was presented to the faculty senate, Dr. Chang wondered what the local high schools would think of ERAU

going to exact grading. This is why input was sought from Deland high school principal, M. Lee Britton.

J. Brittan
Associate Professor Avionics
Engineering Technology

Safe Environment



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1/2 lb. Del. Meat Cheese Burger	1.99		
Bacon Cheese Burger	1.99		
Chicken Sandwich	1.99		
Fish Sandwich	1.99		
French Fries	Large .97 Regular .79		
B.L.T.	1.19		
Hot Dog	.89		
Deluxe Chili Dog	1.19		
All food eaten with chili, sauce, mustard & ketchup			
Apple Nuggen	Large .94 Regular .75		

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Wy' - Eld Wenz-Dae!

The Drink, The Myth

THE LEGEND

According to legend a witch doctor called Wenz-Dae saved the Wy'-Eld tribe from certain extinction many years ago by concocting a secret potion. It seems the people of the Wy'-Eld tribe were just plain bored, boring and uninteresting... and on top of that they they couldn't dance. This potion, legend states, was so inspiring that soon the better part of the dark continent was dancing to the boogie beat of the Wy'-Eld ones. As a matter of fact, partaking of this potion became part of the Wy'-Eld rite of manhood and was known as the ritual of Wy'-Eld Wenz-Dae. Unfortunately, Wenz-Dae took the recipe with him when he went and it remained locked in his tomb for 6,000 years. Then in 1944, Professor D.S. Tillery uncovered the tomb and immediately set about mixing up a fresh batch of the potion... a pinch of sweet rhino horn, a dash of cola nuts, secret distilled grains and the mystic Wy'-Eld incantation "Git Dow'n Witcho Bad Se'l." Inspired by the mixture, the aged and balding D.S. Tillery immediately spouted a full head of hair and was endowed the stamina and sex appeal of a 20 year old decathlete. He was last seen bounding off into the jungle with a bevy of native maidens in hot pursuit, and to this day in memory of Professor D.S. Tillery, Jungle Jim's Still Practices this ancient ritual for their patrons who want to Git Dow'n every Wenz-Dae.

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