EMBRY-RIDDLE
Aeronautical University
SCHOLARLY COMMONS

Avion | Newspapers

3-6-1991

Avion 1991-03-06 (B)

Embry-Riddle Aeronautical University

Follow this and additional works at: https://commons.erau.edu/avion

This Book is brought to you for free and open access by the Newspapers at Scholarly Commons. It has been accepted for inclusion in Avion by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.

AERONAUTICA

NASA conducts high angle of attack tests on the F-18

by John McDermott
Aeronautica Editor

NASA's Ames-Dryden Flight Research Facility is using an F-18 Hornet as its High Angle of Attack Research Vehicle (HARV).

The aircraft is an pre-production model on loan from the U.S. Navy. Angle of attack (Alpha) is an engineering term used to describe the angle of an aircraft's body and wings relative to its actual flight path. During maneuvers, pilots often fly at extreme angles of attack with the nose pitched up while the aircraft continues in its original direction. This can lead to conditions in which the airflow around the aircraft becomes separated. In airflow at high angles of attack the forces produced by the aerodynamic surfaces, including lift provided by the wings, are reduced. This often results in insufficient lift to maintain altitude.

The thrust vectoring system consists of modified flight control computers and vanes

The NASA flight research program is producing information at high angles of attack to validate computer codes and wind tunnel results. Successful validation of these will give engineers and aircraft designers a better understanding of aerodynamics, effectiveness of flight controls, and airflow phenomena at high angles of attack. This is expected to lead to design methods providing better maneuverability in future high performance aircraft and make them safer to fly.

The first flight phase began in mid 1987 and lasted two and one half years. It consisted of 101 research flights at angles of attack as high as 55 degrees. Visual studies of the airflow over various parts of the aircraft were made. Special tracer smoke was released through small ports near the forward part of the fuselage and followed the airflow patterns around the aircraft. Short pieces of yarn were taped on the aircraft, and an oil based dye was released onto the aircraft surfaces from 500 small holes around the aircraft's nose.

The airflow patterns of smoke, dye, and tufts were recorded on film and videotape for comparison with computer and wind tunnel predictions. Additional data obtained included pressures recorded by sensors , located in a 360 degree pattern around the nose and at other locations on the aircraft.

Phase Two flights are scheduled to begin this Spring after initial flight testing of a thrust vectoring system and preflight ground tests. The thrust vectoring system will allow the exhaust flow from the two turbofan engines to be redirected to provide enhanced maneuverability and control in areas where conventional aerodynamic controls, ailerons rudders, and elevators are ineffective. This will result in significantly increased maneuverability at moderate angles of attack and control at angles of attack near 70 degrees.

The thrust vectoring system consists of modified flight control computers and vanes to direct the engine exhaust flow. Three spoon shaped paddles made of Inconel alloy are mounted on the airframe around each engines' exhaust. They provide both pitch and yaw forces to enhance maneuverability when the aerodynamic controls are either unusable or less effective than desired. The engines have had the external exhaust nozzles removed to shorten the distance the vanes must be cantilevered by about two feet. The subsonic performance of the engines, including afterburning, is unaffected by the modifications, but supersonic flight is no longer possible, a penalty unique to this experimental project. The thrust vectoring system adds 2,100 pounds to the total weight of the aircraft. The modified flight control computers use a PACE 1750A computer and specially written flight control laws to command the optimum combination of aerodynamic control and vectored thrust to satisfy pilot demand. Standard cockpit controls are used by the pilot and no special pilot action is required after engaging the system.

A Phase Three effort is currently underway to design moveable strakes which can be mounted on both sides of the aircraft's nose to provide yaw control at high angles of attack. These strakes, four feet long and six inches wide, will be hinged on one side and mounted to the forward sides of the fuselage. At low angles of attack, they will be folded flush against the aircraft skin. At higher angles of attack, they will be extended to interact with the strong vortices generated along the nose and produce large side forces for control. Preliminary wind tunnel tests indicate these small control surfaces can be effective at high angles of attack as the rudders are at lower angles.

Vectored Thrust...
NASA's F-18 shows off its new thrust vectoring devices on a test flight

New Tomahawk recently flight tested by the Navy

Electric Glass Cockpit...
Lockheed Test Pilots check the displays for the C-130 Hercules transport

by John McDermott
Aeronautica Editor

McDonnell-Douglas An improved U.S. Navy Tomahawk sea launched cruise missile was recently flight tested. The Tomahawk flew a 700 mile fully guided flight to a target area at the Naval Weapons Center, China Lake, CA.

McDonnel-Douglas Missile Systems Co. of Titusville, FL. will build 60 percent of the Navy Tomahawk missiles

Improvements to the Tomahawk can be retrofitted to all Tomahawk land attack cruise missiles, changes include addition of a Global Positioning System receiver, upgrading of the Digital Scene Matching computer, time of arrival computer, and a new payload section. Time of arrival control will allow the Navy to coordinator arrival of the missile with air strikes. A Williams International 402 turbofan with increased thrust and lower fuel consumption, along with an improved warhead have also been added. The new warhead is lighter and smaller, allowing more fuel, which increases range.

McDonnel-Douglas Missile Systems Co. of Titusville, FL. will build 60 percent of the Navy Tomahawk missiles delivered in 1991. A $253.9 million contract for 240 missiles was awarded. In the seven years since McDonnell-Douglas entered the program the price of the missile has dropped by two-thirds, and overall program savings have been estimated at $3.5 billion.

Lockheed Lockheed Aeronautical Systems Co. has developed a Liquid Crystal Display electronic glass cockpit for the C-130 Hercules transport. Six digital LCD flat panel displays replace more than 60 round analog cockpit instruments currently used in the C-130.

The C-130 is the world's most popular and widely used turbine powered heavy transport. 1,950 Hercules have been delivered to operators worldwide.

The C-130 is the largest aircraft ever to land on, or take off from an aircraft carrier without using a tailhook for landing, or a catapult assist for takeoff. Lockheed builds an average of 36 Hercules aircraft per year at its plant in Marietta, GA.

Collins Certification of the EFIS-84 Electronic Flight Instrumentation System on the Cessna Conquest 441 has been completed. The four inch EFIS successfully passed FAA conditions for High Intensity Radiated Fields and Lightning testing. The new installation includes the AFS-65 Digital Autopilot, TWR-850 Turbulence Weather Radar and Pro Line II Comm/Nav/Pulse.

Aerospace Society presents ERAU alumni speaker

by Brian Marchesseault
Space Technology Writer

Last Wednesday the Aerospace Society welcomed ERAU Alumnus Mr. Ken Jang, Program Manager of Pratt & Whitney's Government Engine Business Division in West Palm Beach, Fl. The approximately 50 students that turned out for the presentation were treated to a unique inside look at the aviation industry. The information Jang presented was recently declassified by the government.

Jang began his career in the aerospace industry after receiving his Master's Degree from the University of Connecticut. But, he began it all by graduating from Embry-Riddle in 1969. At Pratt & Whitney he has worked on the development of the engines for the Boeing 747, 757, 767, and the McDonnell-Douglas MD-80. His most recent project as Program Manager is the Integrated High Performance Turbine Engine Technology (IHPTET) 2X Initiative. IHPTET was the focus of his presentation last Wednesday night.

The goal of IHPTET was stated as doubling turbine engine propulsion capability by the turn of the century. The aircraft involved range from the F-15 to the Advanced Tactical Fighter and the National Aerospace Plane. The specific goals set by the government include improvements in combustion systems, compression systems, turbines, exhaust nozzles, and control systems by the year 2003. In regards to this mission, Jang stated, "Our job in the industry is to prepare for the threat (posed by the Soviet Union)".

Jang explained that the Soviet technology is currently comparable to that of the U.S. Although the Russian SU-27 is less durable than the F-15, it is a higher performance fighter. The detection ranges for the F-15 and SU-27 are equal while the SU-27 is within 30 minutes of its radar base. Outside of this range, the SU-27 has little on board detection capability, but is more maneuverable in a visual contact scenario.

Russian engines are built in mass quantity for very high performance, but in doing so the durability of the engines is limited to about 150 hours. Thus, U.S. durability of over 500 hours is by far dominant. In actual construction of engines, the Soviet engines are very similar to American engines. In particular, the cross section of fan blades are almost identical, says Jang.

The industry's view of the Gulf War is one of optimism as stated by Jang. The situation allows for more opportunities in air defense developments. On the other hand, it also creates a perilous situation for the U.S. in that more American armament data is now in the Soviet's hands. The USSR has been able to gather all of Iraq's field data on the American use and performance of the F-117 and Patriot missile.

Ken Jang

In response to the newly created Soviet information threat, Jang stated the ever changing question, "What can we do to beat the other guy?". He said that this is where Pratt & Whitney's specialty as masters of gas fed propulsion comes into play. "Pratt & Whitney does one thing only, and does it well." The company began its prominence with the development of the baseline F-100 engine with its thrust to weight ratio in the F-15 and F-16 of 8:1.

Pratt & Whitney's newest developments include hollow, rather than solid fan blades. A new Titanium-Aluminum alloy, designated Alloy C has been developed for fan blades as well. Alloy C blades can withstand 2000 degree temperatures, which melt ordinary Titanium or Aluminum blades.

Other recent developments include self contained fiber optic operated actuators, and vectored thrust engines. Current actuators are hydraulically operated and weigh down the aircraft considerably. The new actuators are lighter, with only one small hydraulic device inside which is operated by a light beam. The vectored thrust concept of moving a nozzle allows for much greater maneuverability in controlling tighter turning radii.

Future developments are in magnetic field engines and even a nuclear powered jet engine. A magnetic field engine offers a 30% savings on the aircraft. A Hydrogen fuel (JP-7) engine is being developed currently, in order to give off less light when burning. Jang explained that the light given off by a burning fuel emits a large amount of heat which is visible to an infrared missile. Hydrogen fuel burns with a very light, almost invisible blue, which is less visible to infrared missiles.

The presentation came to an end with a question and answer session in which Jang answered questions on Pratt & Whitney space related roles. The presentation gave an excellent inside view of the industry, and was the freshest possible. In response to the challenges facing the aerospace community, Jang said to prospective pilots, engineers, and other students, "Your job is just beginning".

MD-11 begins service with Delta

by Tami Strout
Aeronautica Writer

Delta Air Lines has selected the Tokyo-Los Angeles flight which originates and ends in Orlando to introduce its new MD-11 aircraft, the worlds newest international airplane.

This month, Delta will continue its expansion of its Orlando Flight Center with the addition of six more round trip flights offering almost 15,000 seats daily.

Delta initiated one stop service to Tokyo on February 6, 1991. The flight, which features the MD-11 in the first scheduled service, incorporates the latest scientific advances in aerodynamics, propulsion, avionics and interior design.

The McDonnell Douglas MD-11 trijets are designed to fulfill airline needs in the 1990s and beyond. A typical three-class seating arrangement with six abreast first class sleeperettes, seven abreast business class, and nine across economy class will transport 293 passengers more than 6,900 nautical miles. The standard tow class passenger arrangement provides accommodations for 323 passengers.

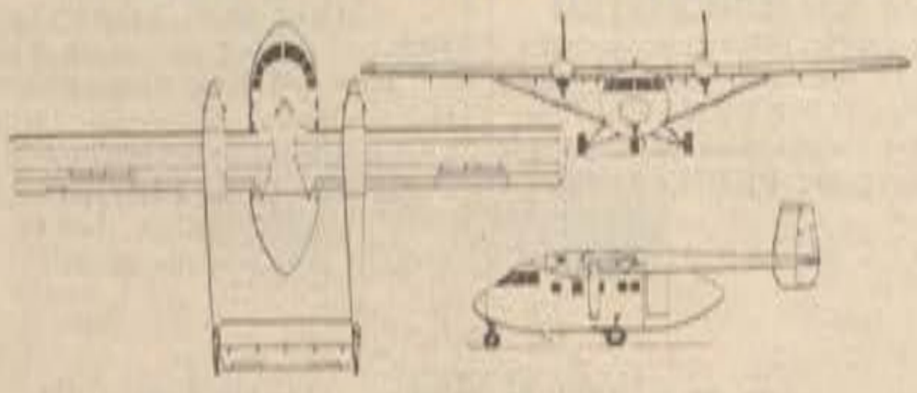
Key design features of the MD-11 include the new two crew flight deck with digital avionics, six cathode ray tube instrument displays, and a fully integrated flight management system. The winglets, new tail cone, and smaller horizontal tail incorporating a trimmable fuel tank are distinctive aerodynamic features.

"Delta is delighted to inaugurate new international service from a 21st century facility using 21st century aircraft," said Don Adams, assistant vice president - associate general counsel. "We are very pleased to be continuing the expansion of our Orlando hub operation linking great cities of the world with Orlando."

Delta's new Orlando to Tokyo service via Los Angeles will depart Orlando International Airport at 8:00am , and arrive at Tokyo's Narita Airport at 4:35pm tomorrow. The return flight will depart Tokyo at 6:35pm and arrive in Orlando at 8:31pm the same day.

Delta is Orlando's number one airline, offering 77 flights and almost 14,000 seats daily. This month, Delta will continue its expansion of its Orlando Flight Center with the addition of six more round trip flights offering almost 15,000 seats daily. In 1990 Delta operated more than 25,000 flights from Orlando carrying over 2.3 million passengers.

Aero Identification



Name_____
ERAU Box #_____

ID Entry_____

Return this form to the *Avion*. The first, exact answer as to the identity of this aircraft, will win a free submarine sandwich of their choice from Sorrento's Deli. The student publication staff, their families and previous winners are not eligible.

How does that hard drive work?

by Joe Cambron
Data Tech Editor

A personal computer hard drive can hold millions of pages of text and recall it almost instantly, but few people know how they work. The word "hard" describes the inflexibility of the platter (the circular aluminum magnetic disk). Flexible disks are referred to as floppies. These disks have a lesser density of data contained on them and are therefore durable enough to sustain harsher treatment than hard disks. The term "drive" refers to the fact that the disk is combined with a self-contained motor which is used to spin the platter (disk) during the data read/write process.

History

The hard drive has its origins in the early 1960s. It was then that IBM secretly developed a 30 megabyte (about 30 million pages of data) hard drive. It was referred to as the 30-30. This designation was immediately associated with the Winchester 30-30 rifle, and thus the name Winchester drive was born. Until recently, every drive using high speed spinning disks and a floating head (an arm similar to the type used on a record player, but suspended above the platter a fraction of an inch) were known as Winchester drives.

How it works

The hard drive is used for encrypting large amounts of binary data on its platters using magnetic voltage variations to identify the "0"'s and "1"'s. This data is tightly packed in concentric circles emanating from the hub of the platter. Hard Drives may read or write data instantaneously. The comparatively slow process of searching the disk for an appropriate spot can take as long as 25 milliseconds.

Construction

Platters: The platters are aluminum disks that usually rotate at about 3600 RPMs. The high rotation speed is needed to facilitate the small access times (time to retrieve or write data) required of today's hard drives. The platters are covered with a media which holds a magnetic charge without requiring a constant current. The media is either iron oxide, 30 millionths of an inch thick, or "thin film." "Thin film" uses an electroplating process to reduce media thickness to just two or three millionths of an inch. This is the primary media type in use today. The platter itself is an eighth inch thick, and both sides are used for data storage.

-Read/Write Heads: These are generally constructed of a ferrite composite which uses an iron oxide core which is surrounded by wire coils. The coils are acted on by the magnetic media when the heads are reading. When writing, the coils are energized with electricity. As they move, blinking on and off, they leave behind a path of "1"'s and "0"'s. The head size varies from drive to drive, but they are generally smaller than a 10,000th of an inch in length and width. One of the more interesting aspects of the head is that, unlike magnetic tape, it never touches the media. It is suspended six millionths of an inch above the disk in order to minimize friction. When the heads do touch the media it is called a head crash and data is destroyed. Sixteen heads may be used on a single multi-plattered drive.

-Spindle: The spindle is the pole at the center of the disks. A motor spins the spindle, thus spinning all the platters simultaneously.

-Head Actuator Arm: The arm is similar to one on a record player. It moves the head over the target and then repositions the head to the next position. Parking a hard drive involves signaling the head actuator to place the heads over an unoccupied part of the platter. Once this precaution is undertaken, a physical shock to the drive will not result in a data loss.

The hard drive is essentially the same device as a floppy disk drive. Both use a spindle, heads, magnetic media covering a disk, and a head actuator. They differ substantially, however. The floppy drive uses removable disks, and those disks are not aluminum. This change allows only a fraction of the amount of data allowed on a hard drive to be stored on a floppy disk.

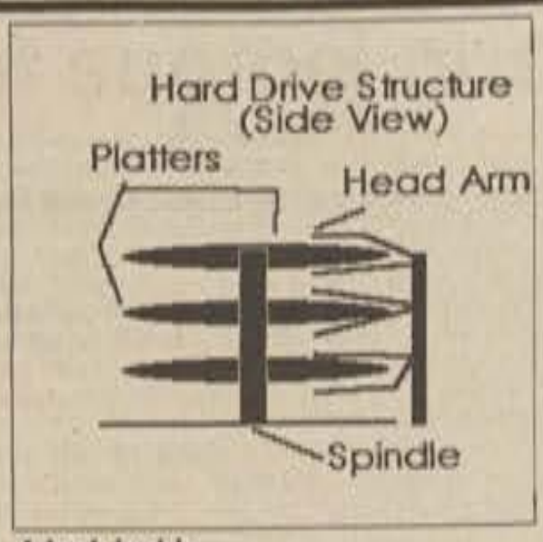
A hard drive is not as durable as a floppy drive. Many people observe the battering that floppy disks endure and assume that their hard drive can sustain similar punishment. This assumption is a poor one. The hard drive is a fragile device of exacting standards. They are not designed to be handled frequently. The hard drive is so fragile that it is completely sealed except for a small valve used to adjust to changes in air pressure. The inside is a scrupulously clean environment. Any shock can disturb miniscule pieces of dust that can fall to cover important bits of data residing on a platter.

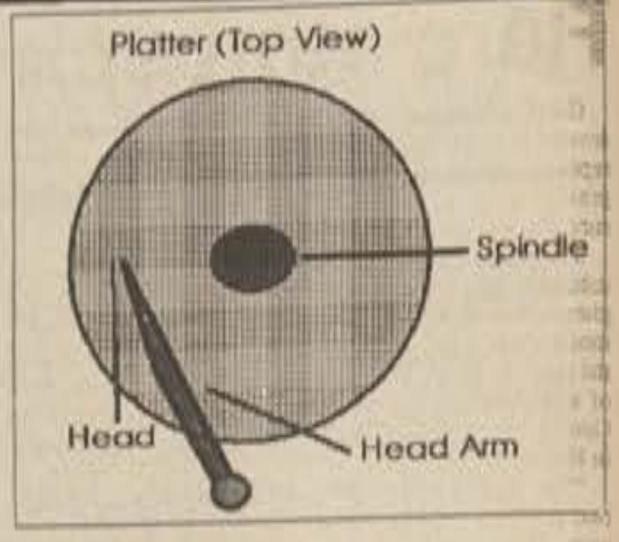
Manufacturers

Fuji, Seagate, Conner (Compaq), Maxtor, Wren (Seagate), Hewlett-Packard, Minscribe (Maxtor), and a slew of others build these devices in high technology plants located primarily in Japan, Korea, and Silicon Valley, California. Drives come in a variety of shapes, sizes, and capacities. Drives hold as little as 10 megabytes or as much as one gigabytes (1,000 megabytes). Drives also differ in their interface to the computer and in their encoding technique. Seagate is the largest manufacuter of hard drives, and many of IBM's own computers use their drives. Conner is widely considered the finest hard drive. Desireable features are auto-park and voice coil actuation (a more durable actuating method than the older but more widely used stepper motor actuated drives), a memory buffer, and on board controller electronics. Each of these add to the cost of a hard drive, but most are worth the extra expense.

Prices

Up until just recently, hard drive space cost about $10 per megabyte. Now, IDE (on-board controller) 40 megabyte hard drives from Seagate are headed toward $200 through the mail.





A look inside...
A hard drive contains a series of platters which hold data in concentric circles.

SimEarth simulates evolution of our solar system

by Joe Cambron
Data Tech Editor

SimEarth is a new simulation from Maxis, the makers of *Sim City*. This is not a sequel to *Sim City*, but rather a complex simulation of life on earth and in our solar system using what is called the Gaia theory.

SimEarth is truly a simulation which takes some getting used to. Unlike *Sim City* which was closer to a game, *Sim Earth* takes a planetary scale. From that macro perspective, users may adjust such things as the greenhouse effect, the sea levels, rainfall, heating and cooling, continental drift, and natural disasters. All of these things affect the real focus of the game which is life.

One may coax dinosaurs into the information age through skillful maneuvering of conditions and mutation/evolution. The simulation has many playing levels and takes some time to learn. The manual weighs in at a substantial enough quantity to scare almost everyone into not reading it. Realizing this inevitability, the designers have included an intensive online help system.

The most interesting configurations involve trying to set up life on other planets, ones that are either too cold or too hot. These scenarios limit your ability to change fundamental natural effects, effectively transforming you from a god to an earthling terraformer. Using tools which release gases into the atmosphere and disasters (ice meteors, earthquakes, typhoons) one must try to make Mars or Venus habitable.

Gaia Theory

James Lovelock proposed a theory which looks at the whole earth as one organism or one integrated system. This view grew out of satellite imaging of the earth as well as the relative constancy of temperature and atmospheric gas ratios.

In the simulations, Gaia is VGA depicted globe with a face-and hopefully a smile. The face's expressions and comments change with your influence to his body.

The Review

SimEarth should be scrupulously referred to as a simulation not a game. The real difference is that a simulation does not really need you for anything other than supervision. *Sim City* required the user to zone property and build things before anything could be simulated, and then the simulation only worked within the framework of what had been created or designated by the player. *SimEarth* is fundamentally different. It is possible to select a scenario, go take a shower and come back to find *SimEarth* well on its way to solving its own problems.

SimEarth is much more a "hands-off" program than *Sim City*. *SimEarth* is as much a scientific study as a game. People who enjoy playing "what if" will find the game irresistible, while those who look for hard action will not.

courtesy by Broderbund Software Inc.

Around the world in...
SimEarth will let you go around the world in milliseconds.

80386SX by Protek $1299

16 Megahertz
4 Megabytes of RAM (80ns)
40 Meg Hard Drive (25ms)
Mouse
Joystick
EGA Card
Printer (180cps)
Keyboard 101 keys
1.2 Megabyte Drive
1.44 Megabyte Drive
$1599 with new VGA monitor
Leave Message at 238-7355

NEW PRICING

AMIGA

NEW PRICING

EDUCATIONAL DISCOUNTS

The Computer for the Creative Mind...and PC compatibility, too!

Education Package A:
AMIGA 500 P/2 SYSTEM
A500 CPU, 1Mb RAM, Mouse, Keyboard, 2 Mouse Ports, Serial & Parallel Ports, A1011 3.5 Disk Drive, A1084S Monitor, AmigaVision, Appetizer Software
List Price: $1,397 **PRICE: $799**

Education Package B:
AMIGA A2000/2 SYSTEM
A2000 CPU, 1Mb RAM, Mouse, Keyboard, 2 Mouse Ports, Serial & Parallel Ports, 2 Internal Disk Drives
AmigaVision, A1084S Monitor
List Price: $2,157 **PRICE: $1,447**

Education Package C:
AMIGA A2000HD SYSTEM
A2000 HD CPU, 1 Mb RAM, Keyboard, Mouse, 50 Mb Hard Drive, 2 Mouse Ports, Serial & Parallel Ports, AmigaVision, AT Bridgeboard, A1084S Monitor
List Price: $3,197 **PRICE: $2,098**

Education Package D:
AMIGA A2500/30 SYSTEM
A2500/30 CPU (25MHz), 68882 math co-processor, 5 Mb RAM, Mouse, 50 Mb Hard Drive, AT Bridgeboard, AmigaVision, A1084S Monitor
List Price: $4,997 **PRICE: $3,387**

Education Package E:
AMIGA A2500/30 SYSTEM
A2500/30 CPU (25MHz), 68882 math co-processor, 5 Mb RAM, Mouse, 100 Mb Hard Drive, AT Bridgeboard, AmigaVision, A1084S Monitor
List Price: $5,647 **PRICE: $4,042**

Education Package F:
AMIGA 3000-25/50 SYSTEM
68030 CPU (25MHz), 68882 math co-processor, 2 Mb RAM, 3.5" Disk Drive, 50 Mb HD, Mouse, SCSI Interface, 15.75 & 31.5 Khz Video Ports, Multiscan RGB Analog Monitor and AmigaVision
List Price: $4,298 **PRICE: $3,023**

Education Package G:
AMIGA 3000-25/100 SYSTEM
68030 CPU (25MHz), 68882 math co-processor, 5 Mb RAM, 3.5" Disk Drive, 100 Mb HD, Mouse, SCSI Interface, 15.75 & 31.5 Khz Video Ports, Multiscan RGB Analog Monitor and AmigaVision
List Price: $5,498 **PRICE: $3,948**

Education Package H:
AMIGA 3000UXD SYSTEM
68030 CPU (25MHz), co-processor, 9 Mb RAM, 3.5" Drive, 200 Mb HD, Mouse, Ethernet Board, Multiscan Monitor, AmigaVision, UNIX System V R 4, X Windows, Open Look, Network Software
List Price: $7,798 **PRICE: $5,676**

See your local Commodore-Amiga dealer for terms and further details.

COMPUTERS PLUS
2455 Volusia Ave. (Volusia Sq. 2 blks. E. of I-95 on US-92)
Daytona Bch., FL 32114 (904) 252-6442
Commodore, Amiga and AmigaVision are registered trademarks of Commodore-Amiga, Inc.

$200 Value

FREE

SPINAL EXAM
FREE X-RAYS (If Needed)

We want to acquaint you with a modern approach to effective, painless, and drugless health care. To make this available to you, we're making this generous offer. We handle all paperwork.

MARDER CHIROPRACTIC
1301 Beville Road, Daytona Beach
756-2900

Expires March 13, 1991

THE PATIENT AND ANY OTHER PERSON RESPONSIBLE FOR PAYMENT HAS A RIGHT TO REFUSE TO PAY, CANCEL PAYMENT OR BE REIMBURSED FOR PAYMENT FOR ANY OTHER SERVICE, EXAMINATION OR TREATMENT WHICH IS PERFORMED AS A RESULT OF AND WITHIN 72 HOURS OF RESPONDING TO THE ADVERTISEMENT FOR THE FREE, DISCOUNTED FEE OR REDUCED FEE SERVICE, EXAMINATION OR TREATMENT.

$200 Value

Rare atmospheric isotope found on long duration facility

(NASA News) Kennedy Space Center - Scientists from several U.S. government and university laboratories have reported finding the rare atmospheric isotope Beryllium-7 present on the surface of NASA's Long Duration Exposure Facility (LDEF).

The isotope Beryllium-7 is radioactive and produced naturally by cosmic ray reactions in the Earth's atmosphere. Although very rare, the isotope is detectable by modern nuclear instrumentation and has been studied in the past as a means of tracing the distribution and transport of atmospheric gases in the lower atmosphere, said Dr. Gerald J. Fishman of Nasa's Marshall Space Flight Center, in Huntsville, Alabama.

"The finding is thought to be significant from at least two different aspects," said Fishman. "First, it is known that the isotope is mainly produced at much lower altitudes in the atmosphere than where the LDEF was orbiting. The detection and measurements show that some, as yet undetermined, process efficiently carries it to high altitudes.

"Additional and more detailed measurements of this type may lead to a better understanding of the movement of rare atmospheric components over the globe at high altitudes," he said.

"Secondly, prior to this finding, there was only one atmospheric gas known to strongly interact with orbiting spacecraft. That gas, atomic oxygen, has been found to be very significant, leading to the degradation of various spacecraft surfaces. The detection of Beryllium-7 on the LDEF surface will allow scientists to study in greater detail the interaction of gases with spacecraft in low Earth orbit," said Fishman.

The isotope Beryllium-7 is radioactive and produced naturally by cosmic ray reactions in the Earth's atmosphere.

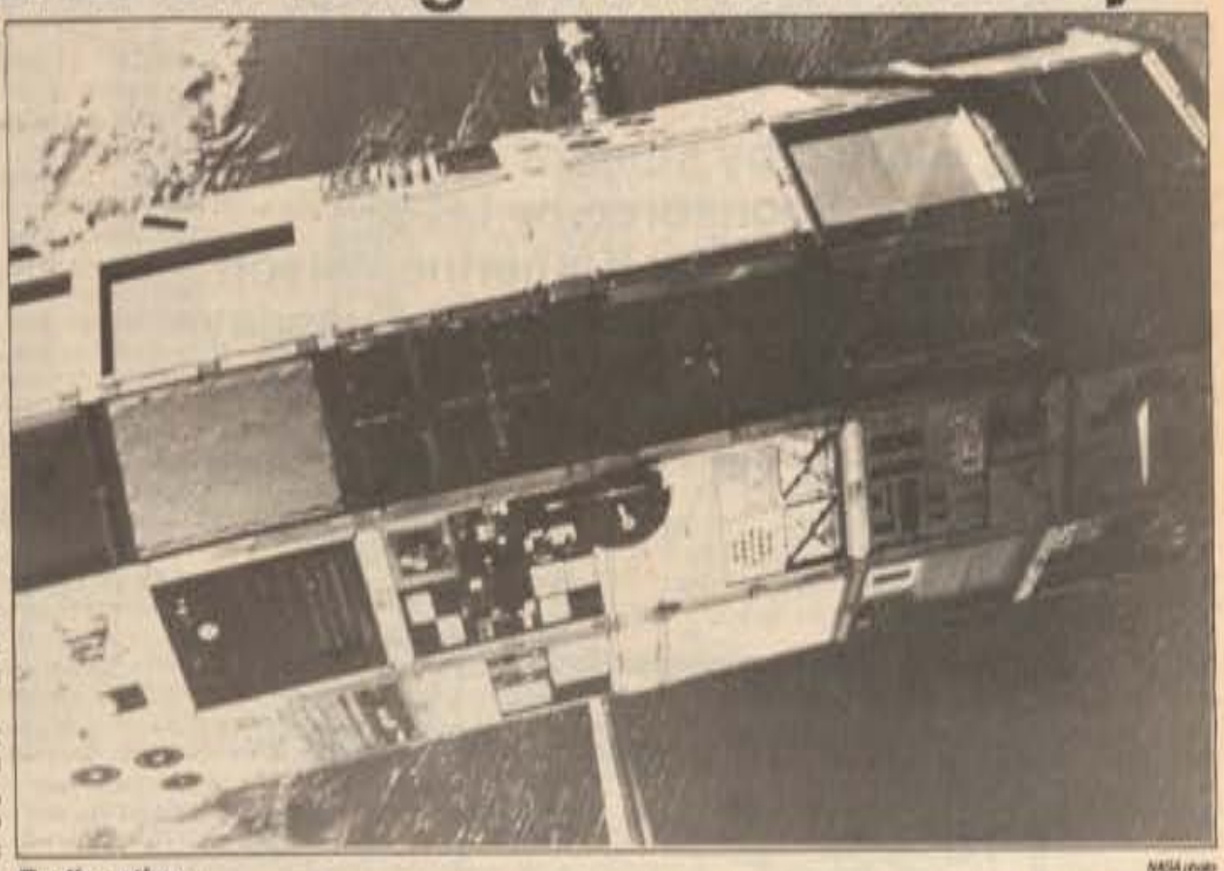
"A team of scientists found the isotope on the LDEF during measurements at the Kennedy Space Center shortly after its return. At approximately the same time, researchers working with removed external spacecraft components at the Marshall Space Flight Center and the University of Alabama, Huntsville, confirmed the Beryllium-7 presence and showed that it was confirmed to a very thin layer - the surfaces of the leading edge of the LDEF," said Fishman. The NASA scientist is part of a radiation group investigating materials and radiation data returned from LDEF.

The findings involved the collaboration of scientists from the Marshall Space Flight Center, Universities Space Research Association, Huntsville; University of Alabama, Huntsville; Naval Research Laboratory, Washington, D.C.; University of Florida; Institute for Space Science and Technology, Gainesville, Florida; and Mississippi State University.

The Long Duration Exposure Facility was returned from space by the Space Shuttle *Columbia* in January 1990 after nearly 6 years in Earth orbit.

LDEF is a 12-sided cylindrical structure 30 feet long and 14 feet in diameter. The LDEF spacecraft was designed to test the performance of spacecraft materials, components and systems that have been exposed to micrometeroids, space debris, space vacuum, atomic oxygen, solar ultraviolet and space radiation for an extended period of time.

LDEF carried 57 experiments and involved participation of several hundred scientists and engineers in the data analysis. The Long Duration Exposure Facility program is managed by NASA's Langley Research Center.



NASA photo

Radioactive...
The Long Duration Exposure Facility (LDEF), seen here being retrieved by the Space Shuttle *Columbia* in January 1990, has been found to contain a very thin layer of Beryllium-7 on the leading edge of the surfaces. Beryllium-7 is a rare, radioactive, atmospheric isotope.

photo courtesy of IBM

New and improved...
The general purpose computers on the space shuttle fleet are being updated. The new AP-101S have 262,000 words in the core memory and processes at a rate of up to 1 million instructions per second.

Updated computers to provide greater reliability

*by **Joshua S. Mussat***
Space Technology Editor

NASA is in the process of upgrading each of the Shuttle orbiters' five general purpose computers to provide greater reliability and efficiency. The computers serve as the spacecraft's "brain," controlling most systems and performing systems and performing systems management and payload operations. The new computers, designed in 1984, will incorporate more capabilities and apply advance computer technologies not available in 1972 when the present computers were designed. Installation of the first and second sets of five identical computers in the orbiters *Discovery* and *Atlantis* have been completed. *Columbia* will be modified at a later date.

The IBM AP-101S computers, at 64 pounds, are half the weight and size of the old computers and require less power to operate. Still, the new computers will provide more than twice the memory and three times the processing speed of their predecessors, the AP-101B.

The new enhancements found in the new computers were designed to build on the capabilities of the original computers by incorporating new data processing technology and advanced machine architecture into the existing system, resulting in only subtle changes in the use of existing Shuttle software. The increases in the memory capacity and in processing speed opens the door for future innovation in the use of the onboard data processing systems.

Orbiter Update

ATLANTIS The orbiter *Atlantis* is undergoing preparations for a rollover to the Vehicle Assembly Building (VAB) late on March 7 or early the next day. Closeout of the midbody and aft compartments continue, in preparation for rollover to the VAB. The only concerns at this time are evaluation of a very small crack on each of the forward lug hinges of the left and right external tank umbilical door drive mechanisms. These cracks were found after evaluation of several dye tests and inspections. Additional tests are underway to recheck all four lug hinges.

Atlantis is scheduled to be launched in April with the Gamma Ray Observatory.

DISCOVERY Preparations for rolling back the vehicle to the Vehicle Assembly building are underway. The vehicle will not return from the pad before 2 a.m. March 7. Currently, workers at the pad are offloading hypergolic propellants from the orbital maneuvering system and reaction control system. Workers have already transferred the STS-39 Air Force Program 675 payload from *Discovery's* payload bay to the Payload Changeout Room on Monday.

Discovery is now scheduled to be launch in late April or early May on an unclassified DOD mission.

COLUMBIA The orbiter is undergoing routine maintenance procedures of checking, replacing, and inspecting all critical systems on the shuttle. *Columbia* is scheduled to launch in May with Spacelab Life Sciences 1.

WANTED
Commuter Airline
First Officer Course
AVTAR
AVTAR Is Seeking Qualified First Officer Candidates To Attend Our FAR Part 135 First Officer Training Course. Each Flight Candidate Is Guaranteed 100 Hours Of Actual Flight Time With A Commuter Airline. This Will Include An Actual FAA 135 Checkride In Addition To The Training. Cost Per Candidate Is $8,500. Space Is Limited.
Course Includes: Flight / Ground Training / Books, FAA Checkride, 100 Hours Piston Multi - Engine Time
Contact : AVTAR INC.
PO Box 11326
Daytona Beach, Florida 32120
(904) 760-1705 - Fax (904) 760-0164

"CALVIN!"

☐ Please send me _____ copy(ies) of *The Authoritative Calvin and Hobbes* at $12.95 per copy paperback or $19.95 per copy hardback plus $1.00 postage and handling for each copy, total: _____. Please allow 4-6 weeks for delivery. *Avion*
☐ Check. *Make check payable to Andrews and McMeel*
☐ Visa # _____
☐ MasterCard # _____
Exp. Date _____
_____ Signature
Name _____
Address _____
City _____ State _____
Zip _____ Phone (___) _____
Send to: *The Authoritative Calvin and Hobbes*, c/o This Newspaper, P.O. Box 419150, Kansas City, MO 64141

FREE Tax Help
Staffed by student volunteers
Sponsored by I.R.S.
Supervised by Katherine Wilson
Room A117 at 5:30pm on Tuesdays

HAPPY HOUR
5 PM - 9 PM
75¢ Drafts
1 Doz. Oysters Steamed or Raw $1.95
Michelobs 6-8 oz. in a Bucket $5.00
LIVE ISLAND REGGAE NIGHTLY 9 PM-2 AM
Ocean View Dance Floor
253-5224
127 S. Ocean Ave.
(Next To Mayan Inn Directly On The Ocean)
OPEN DAILY
11AM-3AM
Seafood
Oysters
Clams, Shrimp
Sandwiches
MONDAY NIGHTS 7 - 12 P.M. $1.00 BUD NITE
TUESDAY NIGHTS 7 - 12 P.M. 2 for 1 MIXED DRINKS
WEDNESDAY NIGHTS T-SHIRT NIGHT WEAR YOUR OCEAN DECK T-SHIRTS $1.00 MIXED DRINKS
THURSDAY NIGHTS $1.00 IMPORT BEER
THE ONLY PLACE TO PARTY ANY WEEKEND!!!

SORRENTO'S PIZZA
Deli, Subs, Pizza, Stromboli, Calzones, Eggplant, Stuffed Shells, Manicotti
SORRENTO'S
ERAU SORRENTO'S
$1.00 OFF ANY SANDWICH IN THE HOUSE!
or
FREE MEATBALLS OR SAUSAGE With Your Dinner
Coupon ERAU
Daily Specials !
Fresh Fruit Italian Ices
Walking Distance From ERAU!
Free Delivery 255-1817
1344 Volusia Ave. K-mart Plaza

FREE Tax Help

Staffed by student volunteers
Sponsored by I.R.S.
Supervised by Katherine Wilson
Room A117 at 5:30pm on Tuesdays

HAPPY HOUR
5 PM - 9 PM
75¢ Drafts
One Oysters
Steamed or Raw $1.95
Mimosas
Bucket $5.00

LIVE ISLAND REGGAE NIGHTLY
9 PM-2 AM
Ocean View Dance Floor
253-5224
127 S. Ocean Ave.
(Next to Mayan Inn Directly On The Ocean)

OPEN DAILY
11AM-3AM
Seafood
Oysters
Clams, Shrimp
Sandwiches

MONDAY NIGHTS	TUESDAY NIGHTS	WEDNESDAY NIGHTS	THURSDAY NIGHTS
7 - 12 P.M.	7 - 12 P.M.	T-SHIRT NIGHT	$1.00
$1.00 BUD NITE	2 for 1 MIXED DRINKS	WEAR YOUR OCEAN DECK T-SHIRTS $1.00 MIXED DRINKS	IMPORT BEER

THE ONLY PLACE TO PARTY ANY WEEKEND!!!

hand wash vacumm

Let us put you in a clean car

PETE'S AUTO DETAILING
&
Auto Repairs

Embry-Riddle Aero. Univ. Students
This coupon gets you 10% discount

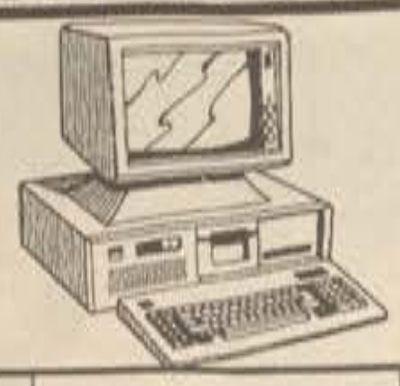
shampoo engine cleaning hand wax

825 Mason Ave.
Daytona Beach, FL 32117

Business (904) 258-3754
Home (904) 252-8149

WE'VE MOVED TO A NEW LARGER & MORE CONVENIENT LOCATION!
COMPUTERS UNLIMITED

386-SX SYSTEM
$1720.00
80386-SX 16MHz
1MB RAM
1.2 OR 1.44 FLOPPY
40MB HARD DRIVE
VGA COLOR MONITOR
2 SERIAL/1 PARALLEL
101 KEYBOARD



286 SYSTEM
$995.00
80286 12MHz
1MB RAM
1.2 OR 1.44 FLOPPY
20MB HARD DRIVE
MONO MONITOR
2 SERIAL/1 PARALLEL
101 KEYBOARD

GENIUS MOUSE WITH DR HALO $34.95 LIFETIME WARRANTY

VGA COLOR MONITOR .31 DOT PITCH $369.00* 2 YEAR WARRANTY

OUR NEW LOCATION IS
1500 BEVILLE ROAD
SUITE 402
DAYTONA BCH FL
SHOPPES OF BEVILLE
NEXT TO PUBLIX
252-3911

CITIZEN COLOR PRINTERS
GSX 140
24 PIN, PUSH TRACTOR
$ 369*
200 GX
9 PIN, PUSH TRACTOR
$ 239*
BOTH INCLUDE COLOR KIT

COMPLETE SERVICE DEPT.
REPAIRS
UPGRADES

RGB COLOR MONITOR 640x200 RES $249.00 2 YEAR WARRANTY

MEMO

To: Students/Faculty/
and Staff
From: *Phoenix* Yearbook
Re: Yearbook Distribution

Spend the rest of
your life with
every girl you
knew in college.

Only in the
Phoenix!

Get your copy
from the *Phoenix*
Office or call
extension 6078.

Calvin and Hobbes — by Bill Waterson

Far Side — by Gary Larson

"See how the vegetation has been trampled flat here, Jimmy? That tells me where a deer bedded down for the night. After a while, you'll develop an eye for these things yourself."

"Wait, wait, wait . . . I'm confused. Bob, *you're* the one who's claiming your Siamese twin, Frank, changes into a werewolf every full moon?"

The birth of head-hunting

"Make a note of this, Muldoon. . . . The wounds seem to be caused by bird shot . . . big bird shot."

Giraffe tough guys

Mister Boffo — by Joe Martin

Mother Goose and Grimm — by Mike Peters

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.

Space research program announced

The Florida Space Grant Consortium (FSGC) has announced an Undergraduate Space Research Participation (USRP) program for Summer '91. The USRP program is designed to provide opportunities for students to become actively involved in ongoing research under the supervision of eminent faculty and researchers and to enhance students' interest in graduate study and careers in a wide variety of aerospace-related areas. To apply for this program, a faculty researcher may propose to mentor an undergraduate student during a 10 week Summer '91 research project. A $2,000 student stipend plus additional funds for research of women, minority and disabled students. Contact the School of Graduate Studies and Research for additional information.

United Airlines Captain to speak in UC

The Embry-Riddle Precision Flight Team is proud to have United Airlines Captain E. Witt Simpson speak to the ERAU student body. On Tuesday, March 12 at 8:00 p.m. It will be held at the Student Center (UC) Captain Simpson will discuss Cockpit Resource Management, Crew Coordination, and welcome any questions concerning airline careers. Please plan to attend this FREE informative event.

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 seventeen 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.

WERU
Broadcast Club
Disk Jockey Service

Parties, Formals...You Name It, We'll Play It.

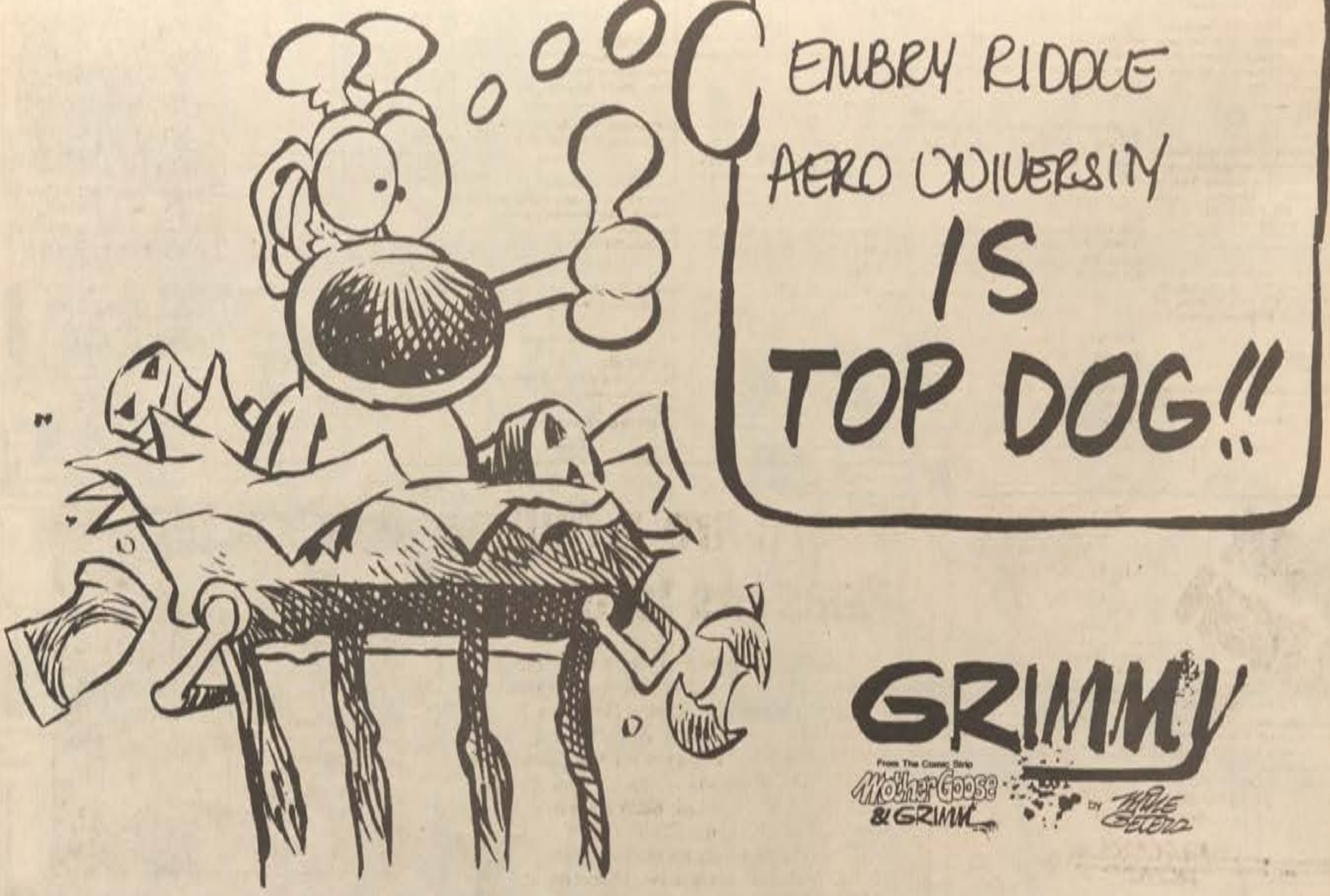
Guarenteed Lowest Prices

No Commercial DJ Service Can Beat Us.

We Need A Radio Station!

Call Gumbi at 239-6539

Safe Environment



✈ Autos for sale

1982 CAMARO--Berlinetta. Totally Bitchin'. Mint condition, new battery, tires, exhaust, shocks and struts, and paint. Give me a call in the evening or leave a message 2239-6539, ask for Gumbi.

1980 HONDA--CB 650 needs work, runs well $400 Call Lance 255-4767.

1979 CHEVY SEDAN--$600/OBO 239-6187 or 254-8170

1988 MAZDA 323--A/C 4 Speed, rear window defogger, hatchback, 52,500 miles, runs great, $4500. Call for after 6 p.m. 767-1998.

1982 PONTIAC FIREBIRD. Power Steering, Brakes, Windows, Mirrors, Antenna, V*, 5 Speed, New Mags, Tires and Bra. Kenwood AM/FM Digital Cassette. $2390/ or Best Offer.
Call Dean 257-4321.

1986 PONTIAC SUNBIRD--Power Steering & Brakes, Cold Air, Stereo, Tilt, Deluxe Velour Interior. Excellent Condition. Call Dean 257-4321.

1969 FORD BLUEBIRD SCHOOLBUS--Runs great, No special license needed. $1000. Call Mike 255-4767 or Box 7702.

Light bar for Jeep with 4 250K candle lights, $50/OBO Call Chas at 274-4061 leave message.

FOR SALE:--1976 Olds Classless "The Urban assault vehicle." Recently credited as liberating Kuwait City with 7 confirmed tank kills. Considered as a replacement for the M-1 Abrams. Infra-red gauges, AAG tape deck [analog-analog-garbage] with 'choice' musical selection. Low maintenance costs as oil never needs changing. Crazy Bob's March Madness Sale-Trade for cheap Can of Beer. Call Bob at 274-5269

✈ Cycles for sale

1988 KAWASAKI EX 500--Great condition, Red w/ Black trim. Just tuned up and Brand new Bridgestone tires. Only ridden from home to school. Only 4,4400 miles. $2000 OBO. Call Mark at 257-3149.

1954 HARLEY-DAVIDSON--1200cc $1500/OBO Call Chas at 274-4061 leave message.

1982 YAMAHA 550 MAXIM; Runs well, Very Reliable transportation; Comes with owners manual, Clymer Repair manual, one piece Raincoat and Helmet(s). $750 OBO Call 756-6789, please leave message if no one is home.

✈ Roommates

ROOMMATE WANTED--non-smoker, townhouse 2 miles from school, own room w/bath, washer + dryer/microwave + more, swimming pool, $250/month + 1/2 utilities (less cable). Call 760-0660

Roommate Desperately Needed! For Summer Avil, Possibly Fall and Spring if things work out. ROTC Pref. (Not a must). Must be clean/non-smoker. Barrington Apts. $167/Mo. Plus util. Contact Chris or Kim immediately! 252-0953.

MUST RENT--one bedroom, one bath, all-house privileges, free cable + phone, 1.5 miles form ERAU. $150/month contact Neil 252-9670

PELICAN BAY--Housing to share for top suite Embry Riddle Student. Contact Neil Grzesko at 756-1916.

✈ Miscellaneous

FOR SALE 50 Meg Hard Card, Segate 157, 6 heads, 28ms ave access time, with controller VERY FAST!!! Paid $550, NOW ONLY $375, Brand new in box! Call 760-3219.

FOR SALE R/C Ducted Fan Unit for .60 to .90 size engines. Balanced 5 bladed prop. All mounting hardware. Produces 12 lbs. thrust at 19,500 RPM. NEVER USED! New cost $100. Now only $80,--Call 760-3219.

IBM PC Convertible and IBM COLOR Display, Two 128 KB Memory, CRT Display Adapter, Serial Parallel Converter $400 - Like New, Hurry! Call 760-5127, Diana.

I found a flight computer. If you can identify it I will be glad to return it. 257-2465

BIKE FOR SALE--Men's 12-Speed Schwinn LeTour White with water bottle cage. Very clean, excellent condition Priced to sell, $175 firm. Call Jeff at 788-2857 or 253-5449.

REWARD!!! $50 reward for information leading to the recovery of a brown Giant Iguana mountain bike stolen from the bike-rack in front of Spruance Hall between 1 p.m. and 9 p.m. on Wednesday, Feb. 27, 1991. Contact ERAU Campus Safety.

MODEM--300 to 9600 Baud. New in box. $125. Call Pete at 761-4264.

FOR SALE: Uni-Syn dual carb synchronizer, never used, $15, Call Ed at 788-1658 or Box 3012.

WANTED TO BUY: Old VW 1600cc engines needing rebuild, just engine or whole car, Call Ed at 788-1658 or Box 3012.

Anyone Going to Tampa March 15-17th? If so please call me, Eric Roy. Will pay 1/2 gas. Thanks. Call me or stop by Dorm 1 RM 359. Phone 252-9401.

PAINTINGS!--NEED A GIFT IDEA? Portraits, outdoor scenes, aircraft, even some D&D scenes...done in oils and/or acrylics on stretched canvas. AVG-$25.00 WRITE to BOX# 5147

FOR SALE R/C Helicopter, .45 engine, fully aerobatic, auto rotation, flies great even for a beginner. ONLY $350. Call 760-3219.

FOR SALE Multi I/O Card. 1 Parallel, 2 Serial, 1 Game. Serial Ports can be configured as COM1: to COM4: Printer port can be configured as lpt1: or lpt2: $30.--Call 760-3219.

Raleigh Technium 12 speed bike with Kryptonite lock $75 call Lance 255-4767

GENERAL ELECTRIC REFRIGERATOR--small frig. perfect for dorms, rarely used. $50 Call Lance at 255-4767

SHARE OWNERSHIP OF AN AIRCRAFT--I'm looking for partners to purchase an aircraft. If you are interested call Jim at 760-1630.

FOR SALE Okidata, Oki 20, 20, for Amiga or IBM, with Centronix interface, 24 pin thermal B/W or color (144 shades). $150. Call 760-3219.

FOR SALE Roland Synthesizer, fully programmable, stereo, with sustain & patch change pedals, 2 groups 8 banks per group and 8 patches per bank, for total of 128 patches. MIDI in, out, thru. Serious inquiries only $800. Call 760-3219.

FOR SALE Full Color Printer, prints all colors in one pass with 36 pin print head. Centronix parallel interface for IBM or Apple. $300. Call 760-3219.

FOR SALE CGA Video Card. Works Good. With cables $45. Call 760-3219.

✈ Personals

SPIC
Better you than me, thanks for saving my. . .!!
M.H.L.P.M.F.

"ALMOST 19"
Hey you, smile. Thanks for being you.
Love, GUMBI

SPIC
How big was she, really?!?
SPARKY
M.M.I.P.

SUNSHINE
Welcome to Daytona Beach. We are going to have the time of our lives. I love you.
CRAIGARS

KIRT,
I'll be down for Spring Break, you'd better put your knives away, run and hide.
J.D.

TO MR. THREE YEARS,
Thanks for getting us together. Hope you do better this Wednesday night.
THE OTHER POOL PAL

DEAN,
Gosh! Gosh! Gosh!
DELTA CHI AIRWAVES.

DINO
My Wheaties have enough whiz in them already!
JOE PLEDGE

KIRT,
Hey, it looks good on MY resume too.
ROG

KIRT,
I'm still picking your car paint out of my car keys! Ha! HA! JESS!!!
D.H.

CLASSIFIED AD POLICY

- Non-commercial classified advertising and personals are **free** to the student body, faculty and staff of Embry-Riddle with a 35 word limit.
- All other non-commercial advertising is $10 with a 35 word limit. Each additional word is 10 cents.
- Commercial advertising is available through the *Avion* advertising department.
- Classified advertising is carried out by filling out a classified ad card in the *Avion* office.
- Only one classified ad per card. Name and address of advertiser must be included for the ad to run.
- Only paid ads will run for two issues and may be renewed by filling out another classified ad card.
- No classified ads will be accepted over the phone.
- For more information, stop by or call the *Avion* office at (904) 239-6049.

BOB
All 1976 Cutlass's have the capability to turn new cars into twisted chunks of molded plastic, but only the Supreme can break Mach, after all. How are you going to outrun a state trooper in a Honda?
Him's Faithful Servant Kato

TANYA THAIS TOLLES
He loves you...He loves you not. He LOVES YOU DAMMIT!!! Now sleep in peace.
Pilot Supreme

CURIOUS FRIEND,
I may or may not have a girlfriend. Depends on who wants to know. Give me some clues.
MR. INTRIGUED

HEY MISS SOUTHERN BELLE!
Lisa didn't fall asleep on my flight so it must be you; not my flying.... don't think about Johann's picture today during the flight and Have Fun! (Now I can use the phone!)
Pilot Supreme!

To the tall blonde from Poland, I think you're Quite Handsome.
SMILEY

MOVIE DUDE
Maybe we'll have to take care of your problem sometime soon. How about going to camp next week. If you think you can hack it.
THE OTHER POOL PAL

Freedom is another word for nothing left to Loose. What do you have left to Loose.

Suicide is a way out; Not a choice on life's road.

PARKING LOT ENTERTAINMENT,
I will forever be within reaching distance.
LOAFERTESTER
P.S. I missed you.

St Patricks Day is on its way. Wouldn't be nice to have some green ice.

---

424 days until Graduation!!!

It's not the dress, the wear of the hair nor who you know will get you there. But more the distance traveled from start to end and the many experiences dared to live, that will be the measure of each ones own success.

Happy Birthday ASHRAM!

Look! G-BOAT

The Wrath of Hilder

THREE AMIGOS,
Had enough leftovers yet??? (And by the way... it felt great!).
PDA

Virile, Strapping, Promiscuous male seeks small, hairy, like-minded female mate(s) with commercial pilots license(s)
Contact "Woody" Box 2615

Smell the ocean spray. See the clouds of gray over green hills all day. Hear the Jets of BA.

THE ANCIENT MARINER
Water, Water everywhere, And all the boards did shrink, Water, Water everywhere, Nor my drop to drink.
A WEDDING GUEST

WOODY SAYS:
If women were meant to fly, the sky would be pink!

TO I'M STUCK
Don't get stuck a lot. And Don't think too hard you might hurt yourself.
FUNKY SHORTS
P.S. Don't forget the keys.

SPECIAL K,
Q. What's tan and dark and Blue all over?
A. Me, missing you.
Hope to see you *really* soon!

TO HOT LADY:
This weekend was really wild. We should do "TI" Again.
FUNKY SHORTS

MR. THREE YEARS
We are going to have to get the balls out of the bunch again. 1 on 1 , You and I. Whenever you're ready.
THE SCRATCHER.

TO TROI:
We should go and hit some Pins Next Friday.
PICARD

Heather: Are you for real, or what?

TO THE DYNAMIC DUO:
Holy Kinkiness Batman! PLEASE get back to me.

Trixie,--Are you really as dense as I think you are? Wake up & smell the coffee. You know what I want
THE A.P.

Rast Smurf,--Good job this weekend. Too bad we only got to do it twice. Just wait till the 23-24, we'll do it all day long, both days. The swiss miss will fall hard!
THE ATOMIC PLAYBOY

Pookums,
Week 3. The 'Seum Saga Continues. I hope you had a good weekend in O'lando. I'm sure that if the Hard Rock wasn't making a profit before Friday, you turned things around for them. It's too bad you didn't heed my warning from last week. Oh well, I guess you're only 21 once.
C. Ed.

TO EVERY MALE ERAU STUDENT
Cut it out! I live with my boyfriend and am just not interested. My arms are weak from never having to open a door for myself. My face is wrinkling prematurely due to the smile on my face pretending to like you. Let's stop this silly game. Now go have a nice day somewhere else.

GIGGLES

SPIC
Congratulations on your record breaking achievement! Mona lives!
THE CLUBHOUSE GANG
M.H.L.P.

Kathy,
Sorry, but you missed the deadline. Maybe I'll get it in for you next week (as long as it's not for Wally). Thanks for lunch the other day, but you know, I really try to stay away from pasta. I hope you had a good time at the Seum, but I'm sure you don't even remember that you were there.
C. Ed.

RACHEL
Who are you? What's your box #? How the hell did you find out my name and/or who I am? Do you know who I am? I'm the real one, not a fake. Stop B.S.ing me.
BOX 6073

HEY MOVIE DUDE
You better hurry and call up/dun!!
MR. THREE YEARS

I am writing this horrible filler because there are not enough personals. That means that you folks, yes you ERAU, did not express those feelings of yours' hidden or otherwise. So get on the ball will ya?!!!!!?!

IBM 55SX		Protek '386SX
'386SX	CPU	'386SX
2Megs	RAM	4Megs
16MHz	Speed	16MHz
30Megs	Hard Dr.	40Megs
VGA	Monitor	VGA
3.5"	Floppy	3.5&5.25
Desktop	Case	Tower
Yes	Mouse	Yes
No	Joystick	Yes
No	Printer	Yes
3.0	Windows	/386
$2349	PRICE!!	$1625

The Protek costs less because I own it and need to sell it. It's in perfect condition. The monitor will be ordered new with warranty.$1825 with Super VGA.
Leave Name and Phone # on machine:
238-7355

FAST FUNDRAISING PROGRAM
$1000 IN JUST ONE WEEK.
Earn up to $1000 in one week for your campus organization.
Plus a chance at $5000 more!
This program works! No investment needed.
Call 1-800-932-0528 Ext. 50

Practically EVERY student is eligible for some form of scholarship, grant, or financial aid. Learn how you can qualify by calling 1-800-222-8142 x006 and receive your FREE brochure.

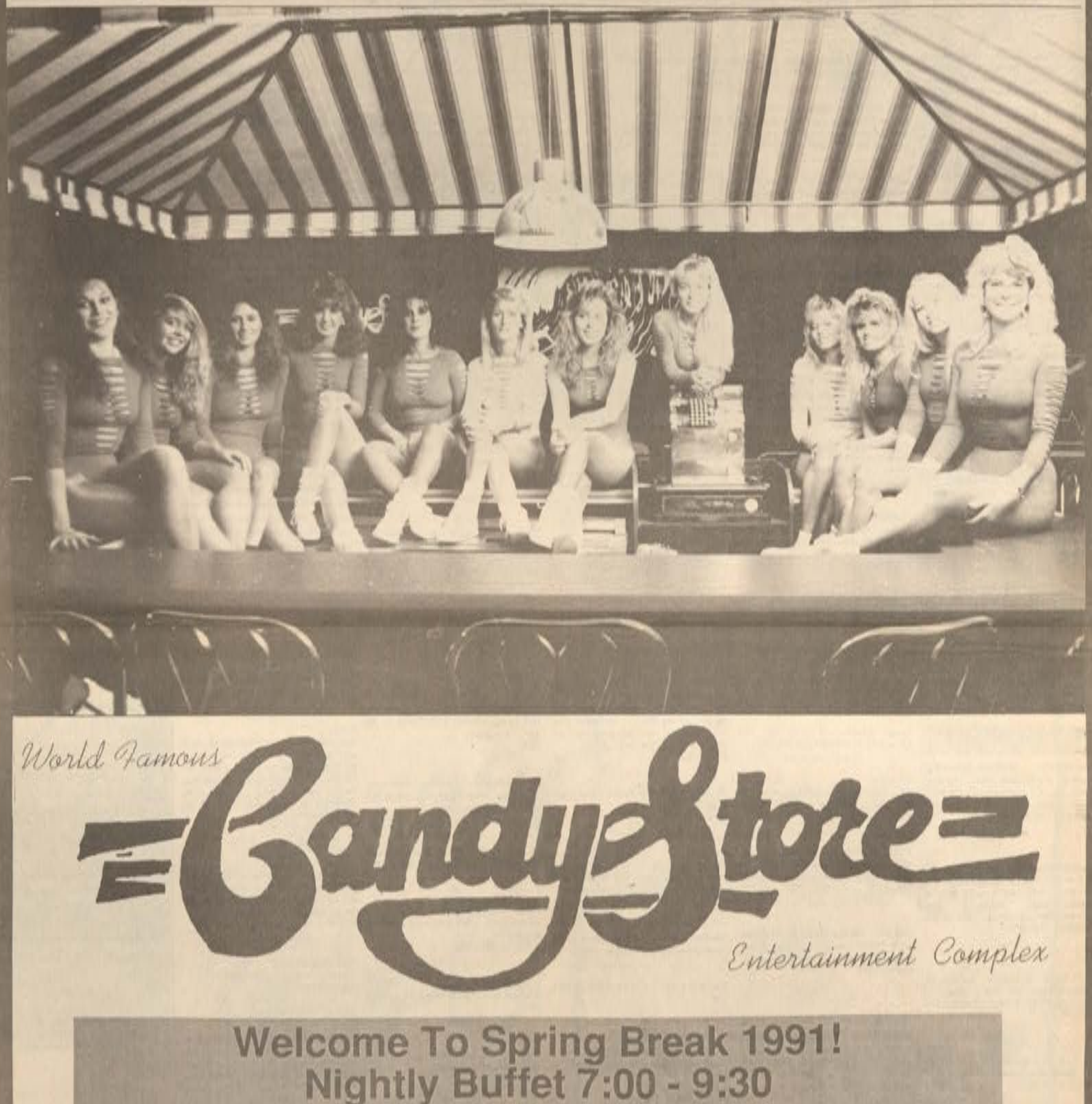
PETE'S PIZZA COMPANY
(From Brooklyn New York)
X - Tra Large 16 " Pizza With 2 Items Regular $10.50 Only $7.99 + tax Pick Or Delivery Coupon ERAU
X - Tra Large 16 " Pizza With 2 Items Reg. $10.50 Only $7.99 + Tax 2nd X-Tra Large Pizza Only $5.99 Coupon ERAU
FREE DELIVERY! 1441 S. Nova Road (Promenade Shopping Center) 253-3707

AIM HIGH
SHARPEN YOUR COMPETITIVE EDGE WITH AIR FORCE ROTC.
No matter what area you've chosen for your college major, you can *enhance* your competitive strengths now. Join Air Force ROTC, and you'll begin the first steps toward becoming an Air Force pilot, navigator, engineer, manager – a range of different disciplines. Most important: your skills and managerial expertise will be built on the solid foundations of leadership that are critical to career success.
Call
DEPT OF AEROSPACE STUDIES
(904) 239-6878
AIR FORCE ROTC
Leadership Excellence Starts Here

There are a Million Reasons to Give
America's young military and their families desperately need our support—and *yours*!
For 130 years the Armed Services Y has served those who serve America, but the need has never been greater than now.
Mail your donation *today* to: The Armed Services YMCA, #215, 6225 Brandon Avenue, Springfield, Virginia 22150-2510.
If you'd like to do more, call Dick Stotz, National Executive Director, at 703-866-1260.

Guess Who's Back In Town?

THE CANDY GIRLS



World Famous

The Candy Store

Entertainment Complex

Welcome To Spring Break 1991!
Nightly Buffet 7:00 - 9:30
All You Can Eat And Drink!
Wet T - Shirt Contest
Friday, Saturday & Sunday

ERAU DISCOUNTS & Specials Every Night!

643 North Grandview Ave. Daytona Beach 255-3833
(Seabreeze & Grandview Ave)