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Space TechnologyB

Volume 64, Issue 12

April 11, 1990

Long awaited Hubble mission delayed again

By **Jose L. Vazquez Jr.**
Space Technology Writer

It was four in the morning when the astronauts were awakened to start preparing for what has been called the most ambitious mission yet, the Hubble mission. The Hubble Space Telescope(HST) was named in honor of Edwin P. Hubble who contributed greatly to the understanding of the nature of galaxies and the expansion of the universe. Once in space the telescope will help scientists answer questions and even create questions to what awaits to be discovered.

Around six o'clock, after the astronauts were fastened to their seats, thousands of cars packed the roads leading to the Kennedy Space Center in hopes of getting a magnificent view of the shuttle as it makes it's way up to the heavens and like many other times, make history.

The expectations were high. There was no problems that would stop the Hubble Space Telescope from being launched, except the weather at the transatlantic abort sites were it was raining. The weather at the Cape had been forecasted to be cloudy with rain showers, but instead it was clear.

When the countdown resumed after the T-9 minutes, launch commentator George Diller noted,"It is very quiet here at the launch center...because we are ready to fly".

The countdown resumed smoothly up to T-4 minutes when it was halted. Telemetry showed that auxiliary power unit one (APU-1) wasn't functioning correctly at low turbine speeds.

Controllers rapidly tried to check the problem, but they only had six and a half minutes, the time the APU's can be held powered up, before the launch would have to be scrubbed. Tension built up and then Bob Seick announced that the launch attempt would be scrubbed.

"It is very quiet here at the launch center...because we are ready to fly"

**George Diller,
Launch Commentator**

There are three APU's in the orbiter. All three have to be in line and functioning together for a launch to proceed. Otherwise the launch is scrubbed since there is no redundant system capable of taking over in case of an APU failure. The APU's are used primarily during take off and landing. They provide hydraulic power to the control surfaces of the shuttle and move the main engines through a series of thrust maneuvers during launch.

NASA has opted to replace the APU while the orbiter is on the pad. Since this has never been done before, a procedure has to be developed and this may take up to two weeks. Mean while the astronauts will return to Houston today for more simulator time.

While all this is taking place, the batteries of the HST will be recharged. These can sit up to three days in the cargo bay of the shuttle between launch attempts. After three days they must be recharged or they won't have enough power to deploy the solar arrays that will ultimately power the telescope once its in geocentric orbit at 380 miles above Earth.

The Hubble Telescope is by itself a complex satellite composed of various components of modular design. This will permit the astronauts to replace any of about 59 replaceable parts that may fail during the 15 year life expectancy of the telescope.

The three major elements of the HST are the support systems module, the optical telescope assembly, and the scientific instruments. The first consists of the exterior structure of the telescope and the various systems that make it possible for the optical telescope assembly and the scientific instruments to perform their job.

The optical telescope assembly consists of two mirrors which collect and focus light from the celestial objects being studied. And finally, the five scientific instrument

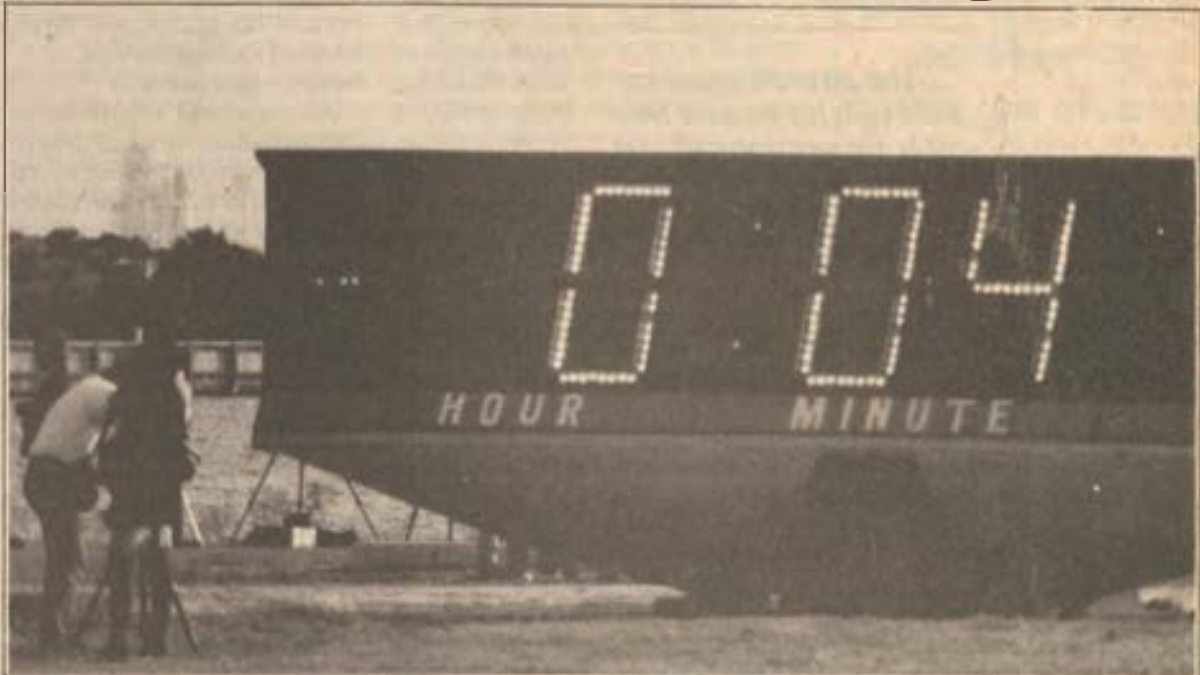


photo by Derrick Seys

It's a scrub...

A faulty APU caused for the cancellation of yesterday's attempted shuttle launch at T-4 minutes. The long awaited mission will deploy the Hubble Space Telescope.

onboard will furnish astronomers with a wide range of information about the galaxies and stars they have studied and the ones which will undoubtedly will be found.

Hubble will go through an orbital verification program which consists of two phases. This program will verify the full and proper functioning of the HST. Both phases will be conducted by support teams at the Goddard Space Flight Center, Greenbelt, Md., Marshall Space Flight Center, and the Huntsville Operations Support Center.

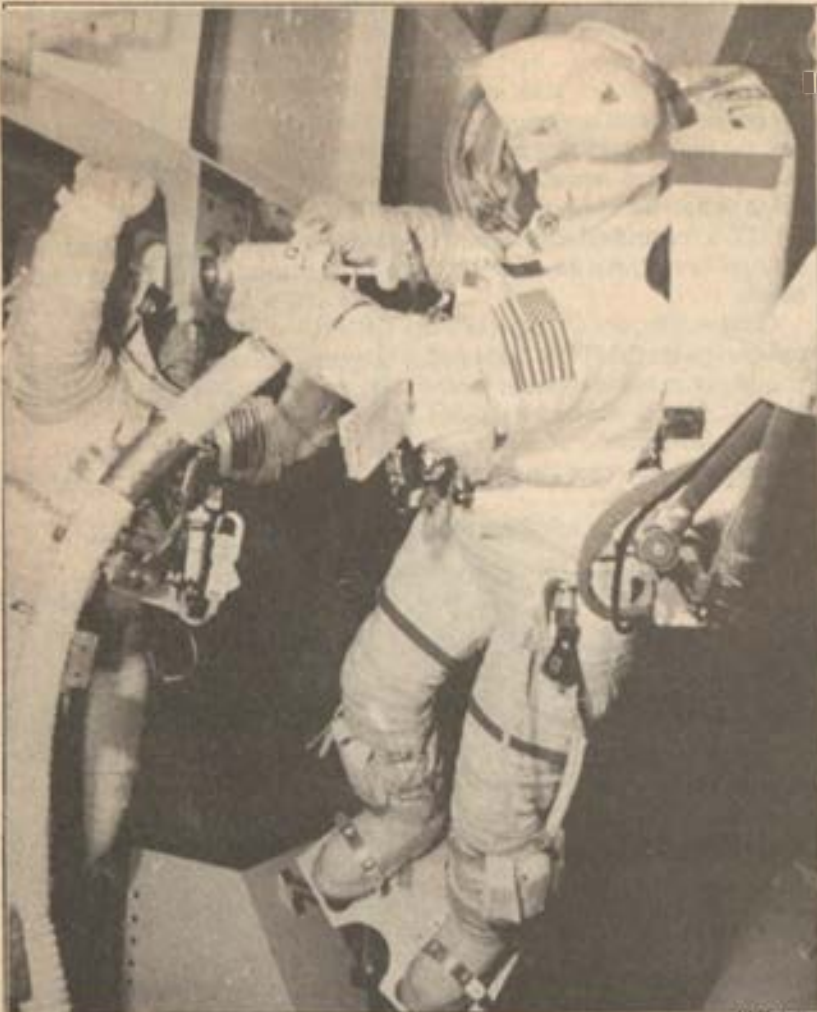
Discovery will follow the telescope for the first two days in case an extra vehicular activity is required any necessary work on the HST. The actual deployment of

HST is set to approximately 30 hours after launch. Actual pictures taken by HST may be seen as soon as four days after the telescope is working.

Besides the HST, two IMAX cameras are being flown on the shuttle to film the HST release and to film part of the upcoming new IMAX film to be shown at the KSC tourist center. Also, five other experiments from various universities across the country will be flown.

Besides setting a few new records, *Discovery* will be testing for the first time the new main landing gear carbon brakes which may lead to landings at KSC again. Touchdown will occur at Edwards, California.

NASA announces summer space flight



NASA photo

Practicing...

Astronauts practice refueling the Gamma Ray Observatory in the neutral bouyancy tank at Johnson Space Center. GRO is scheduled to fly later this year.

by **Joshua S. Mussaf**
Space Technology Writer

As the end of the Spring semester comes to a close, NASA and the shuttle program will continue on. With the current manifest of missions, NASA will have a total of nine missions.

After the Hubble mission, the next scheduled mission will be on May 9, 1990, STS-35 with the orbiter *Columbia*. The seven man crew will be on a nine day flight, on which they will carry the ASTRO-1 observatory. The observatory is designed to obtain ultraviolet (UV) data on astronomical objects using a UV telescope. Also in the cargo bay will be BBXRT-1, the Broad Band X-ray Telescope. This provides high resolution x-ray spectra for both point and extended sources, including stellar coronae, X-ray, binaries, active agalactic nuclei, and clusters of galaxies. There will also be two secondary payload carried aboard. The crew consists of commander Vance D. Brand, pilot Guy S. Gardner, mission specialists John M. Lounge, Jeffery A. Hoffman, Robert A. R. Parker and payload specialists Ronald A. Parise and Samuel T. Durrance. This will be the tenth flight for the orbiter *Columbia*.

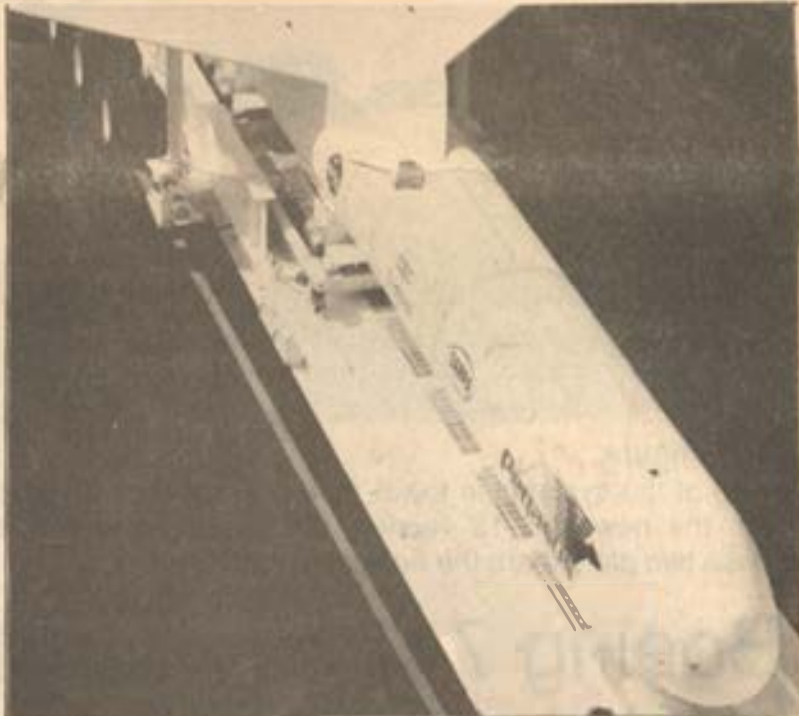
STS-38 will carry five military officers on a Department of Defense (DoD) mission. The orbiter *Atlantis* will be making its seventh flight into space. As with all DoD missions, information about the specific mission is classified. But, we do know the

crew. They are commander Richard O. Covey, pilot Frank L. Culbertson, and mission specialists Robert C. Spinger, Carl J. Meade, and Charles D. "Sam" Gernar.

On August 29, 1990, the orbiter *Columbia* will be making its eleventh flight carrying a seven member male and female crew on a nine day mission. The primary payload of the mission will be the SLS-1, the Spacelab Life Sciences 1 laboratory. The SLS mission will be used to investigate the effects of weightlessness exposure, using both man and animal specimens. A secondary payload will consist of a GAS bridge, in which small, individual experiments are placed in the cargo bay.

The crew consists of Commander Bryan D. O'Connor, pilot Sidney M. Gutierrez, mission specialists M. Rhea Seddon, James P. Bagian and Tenara E. Jernigan and payload specialists F. Drew Gaffney and Millie Hughes-Fulford.

The last three missions of the year will include payloads of the Ulysses spacecraft, an international solar polar mission, the Gamma Ray Observatory, which will investigate extraterrestrial gamma-ray sources, and finally IML-1, the first International Microgravity Laboratory, which will be devoted to material and life science studies. This will conclude the first year of the nineties for NASA, which will prove to be a very ambitious and prosperous decade.



OSC photo

Innovative...

The Pegasus rocket deployed two small satellites last week. The new vehicle is an air launched system.

Pegasus successfully launches satellites

by **Derrick Seys**
Space Technology Editor

Last Thursday, two small payloads were released from a Pegasus rocket proving the effectiveness of the vehicle, its systems, and abilities, and marked the first time an all new unmanned vehicle deployed a payload in 20 years.

A NASA B-52 departed Edwards Air Force Base in California carrying beneath its starboard wing the small Pegasus launch vehicle previously tested, but never released.

After the release at 43,00 feet, Pegasus placed a satellite in orbit for the Defense and Research Projects Agency

(DARPA) and a small, experimental communications satellite for the Navy.

The primary payload, PEGSAT, was jointly developed by NASA's Dryden Flight Research Facility and DARPA. It was designed to measure the craft's attitude, pressure, temperature, and structural loading to aid in the understanding of hypersonic flight and verify the supercomputer design model.

In addition, this satellite will con-

duct a brief experiment on the upper atmosphere. The 422 pound satellite will release barium over Canada to study the Earth's magnetosphere and ionosphere. This test will be conducted later this month.

The satellite marks another success in the commercialization of space. PEGSAT was placed into a 320 nautical mile polar orbit making it an attractive option for users that require the often desirable orbit. Polar orbits

can be achieved from any launch facility, but some, such as Florida, require high energy orbit transfers.

"Today's Pegasus launch was an important

milestone for America's space program and a triumph for our country's commercial space industry," said Orbital Sciences Corporation President and CEO David W. Thompson. OSC and the Hercules Corporation jointly developed, produced, and tested the innovative vehicle.

Currently, DARPA will use the rocket to place another payload into orbit, and the Air Force is planning to follow with two launches.

Freedom challenges assembly personnel

by **Marianne Michaels**
Space Technology Writer

Construction on the Space Station *Freedom* is scheduled to begin in 1995 and should be finished in 1999.

Nothing like this or this big (two football fields) has ever been constructed in space before.

This is the first type of spacecraft that has been constructed solely in space. All the other spacecraft were constructed and checked in clean rooms here on Earth and then placed into orbit in one piece, no assembly required.

The problem engineers have is how to assemble a few pieces of hardware then come back in a month to hopefully find it were you left it. Gravity plays a big role in the space station's construction.

The space shuttle will be the primary carrier for the space station's pieces of equipment. The total number of flights is 29.

The space station assembly will be comprised of 40 teams of two astronauts each. Also included will



NASA artwork

Futuristic?...

The space station *Freedom* is to begin assembly soon. The space base will turn past dreams into reality by giving man a permanent home in the vastness of space.

be two robots being constructed now to assist in the assembly.

One will be built by Canada, the same people who built the space shuttle's manipulator arm. It is called the Mobile Servicing System (MSS) and the other being constructed by the U.S. called the Flight

Telerobotic Servicer (FTS).

The first element of the space station will be a truss about 16 feet on a side. It will be assembled in the payload bay of the space shuttle. The astronauts

see *Freedom*, page B10

F-15 Eagle sprouts new wings as S/MTD

by Joseph A. Salerno
Aeronautica Editor

An F-15 pilot returning from a mission discovers his air base has been hit by an enemy bombing raid, leaving the runways full of craters. Ground crews have managed to patch up some of the damage, but not much. To make matters worse, rain is coming down in buckets, and there's a stiff 30-knot crosswind.

Circling the field, the pilot picks out a small section of runway, about 50 feet wide and 1,500 feet long. That's where he'll attempt to land his plane.

It seems impossible, but there's no other choice.

Will pilot and aircraft make it safely onto the ground? That's what the U.S. Air Force and McDonnell Aircraft are investigating with an F-15 Eagle specially modified to demonstrate several advanced fighter aircraft technologies.

Designed to meet a set of extremely challenging performance criteria, the modified F-15B called the Short Takeoff and Landing/Maneuver Technology Demonstrator (S/MTD) is a one-of-a-kind jet.

In conditions such as at night and in bad weather, in crosswinds gusting to 30 knots, and without active ground-based navigational assistance, the aircraft must be able to land on and take off from sections of wet, bomb-damaged runways measuring no more than 50 feet by 1,500 feet.

The F-15 S/MTD program is managed by the Air Force Flight Dynamics Laboratory of the Wright Research and Development Center (WRDC) at Wright-Patterson Air Force Base, Ohio, which is part of

Aeronautical Systems Division (ASD), the branch authorities responsible for the development and procurement of advanced aircraft for the Air Force.

The F-15 S/MTD program holds the objectives to investigate, develop, and validate advanced technology in four areas:

- two-dimensional thrust-vectoring, thrust-reversing engine nozzles;
- integrated flight/propulsion control;
- rough-field landing gear;
- advanced pilot/vehicle interface

... the aircraft must be able to land on and take off from sections of wet, bomb-damaged runways measuring no more than 50 feet by 1,500 feet.

A pair of two-dimensional thrust-vectoring, thrust-reversing engine nozzles, designed and manufactured by Pratt & Whitney's Government Engine Business unit in West Palm Beach, Florida, were installed on the S/MTD in early 1989. The nozzles will make the S/MTD the first supersonic aircraft to use engine thrust for flight control as well as propulsion.

Plans call for the S/MTD aircraft to fly 100 test missions totaling 150 hours. The first phase of flight testing, lasting approximately five months and using round engine nozzles, began September 7, 1989 in St. Louis.

The F-15 S/MTD flew for the first time with thrust-vectoring, thrust-reversing engine nozzles during the second phase of flight testing, which began May 10, 1989, in St. Louis.

The S/MTD is now involved in a flight-test program at Edwards Air Force Base, California.

McDonnell Douglas was awarded the prime contract in October 1984 by the Flight Dynamics Laboratory, with

major subcontractor positions given to Pratt & Whitney for the nozzles, General Electric for the flight control computers, and National Water Lift for the flight control actuators.

Modifications to the landing gear for rough-field operation were made by Cleveland Pneumatic, while the Hydro-Aire division of Crane Corp. provided a new digital skid control system.

The F-15 S/MTD's autonomous landing guidance capability will include the navigation pod of Martin Marietta's two-pod LANTIRN (Low Altitude Navigation and Targeting InfraRed for Night) system.

Nozzles and canards

A spectacular improvement in maneuverability on the F-15 S/MTD, the world's first supersonic aircraft to use engine thrust for flight control as well as propulsion, comes from integrated use of two-dimensional engine nozzles to direct thrust up, down, and forward, and from moveable canards mounted on the aircraft's forward fuselage.

The lightweight yet durable nozzles, developed by Pratt & Whitney's Government Engine Business division, will generate significant pitch and thrust control that can be used while taking off and landing, or during aerial maneuvers.

The nozzles and canards significantly improve pitch rate, roll rate and deceleration rate. The canards work in conjunction with the nozzles to deliver extra pitch and roll control, while generating added lift during high-angle-of-attack maneuvers and providing additional yaw control.

Three modes of operation are featured with the nozzles: conventional thrust, aft vectoring, and approach/reverse. The S/MTD's nozzles direct thrust straight back, in the conventional-thrust mode, just as today's fighters do with round nozzles.

The nozzles can point as much as 20 degrees up and 20 degrees down in the aft-vectoring mode, providing a control moment similar to that of the horizontal stabilizer.

Operating in the approach/reverse mode, the nozzles close their aft rectangular openings and direct the flow of exhaust gases through a series of vanes mounted on the top and bottom of each nozzle, which rotate like mini-blinds on a bedroom window, forcing the flow of exhaust gases forward or backward to control aircraft speed even though the engines continue to operate at full thrust.

During approach and landing, the throttles act as speed controls by rotating the vanes while the engines remain at full power, and immediately upon touchdown, the pilot can select full thrust reversing by pulling full aft on the throttle. This provides maximum deceleration by rotating the



Bird of prey...

The new McDonnell Douglas F-15 S/MTD is being developed for the U.S. Air Force to enhance its aircraft's wartime capabilities. The new technology will enhance combat abilities as well as takeoff and landing talents of the aircraft.

The vanes full forward. The S/MTD's landing roll will be 72 percent shorter than that of a production F-15.

The vanes would also help pilots gain a tactical advantage during aerial maneuvers. An S/MTD pilot being chased by an adversary could simply engage thrust-reversing in flight and watch his foe go rocketing by without changing his flight path or reducing engine power.

Control system

It might seem an F-15 S/MTD pilot would have to increase his workload to command the plane's advanced engine nozzles and moveable canards with hands and feet already busy commanding control stick, rudder pedals, and throttles.

In fact, the pilot gains a tremendous boost in aircraft maneuverability while actually reducing his workload, made possible by one of the most sophisticated flight control systems ever installed aboard an aircraft - the F-15 S/MTD Integrated Flight/Propulsion Control (IFPC) System.

No matter which of the system's five modes of operation the pilot selects, he can change the aircraft's flight path simply by commanding the F-15 S/MTD's throttle, stick and rudder pedals, just as he would do on any other fighter plane. In the S/MTD, however, he'll find that the aircraft's maneuverability is vastly superior to a production F-15.

The IFPC system is a quantum leap forward in flight control system tech-

nology for several reasons:

- It is the first system to integrate the use of thrust vectoring and thrust reversing for primary flight path control.

- It's flight controllers feature MIL-STD-1750 microprocessors programmed in high order language.

- It is the first digital fly-by-wire flight control system to have made its first flight without any mechanical or dissimilar digital back-up flight controls.

The IFPC system is a quantum leap forward in flight control system technology for several reasons...

After removing the entire production flight control system from the aircraft, MCAIR developed the IFPC system from scratch, and General Electric furnished the system's advanced flight controllers.

Conventional, short takeoff/approach, short landing, cruise, and combat are the IFPC system's five modes of operation.

Electrical signals to the IFPC system are fed through position sensors linked to the throttles, stick, and rudder pedals. Control laws programmed into the flight controllers analyze the pilot's command inputs, then determine what combination of the S/MTD's "control effectors" must be actuated to carry out the pilot's commands.

Control effectors are devices that can change the S/MTD's flight path, and they include aerodynamic control surfaces, such as ailerons, stabilizers, rudders and canards, as well as the aircraft's thrust-vectoring, thrust-

reversing engine nozzles. On the ground, control effectors also include landing gear devices such as brakes and steering.

The critical maneuver of flying the S/MTD aircraft on a glide slope during landing approach is one example of reduced pilot workload. The S/MTD pilot positions the throttle to select his approach speed, then sets up his flight path angle with the control stick.

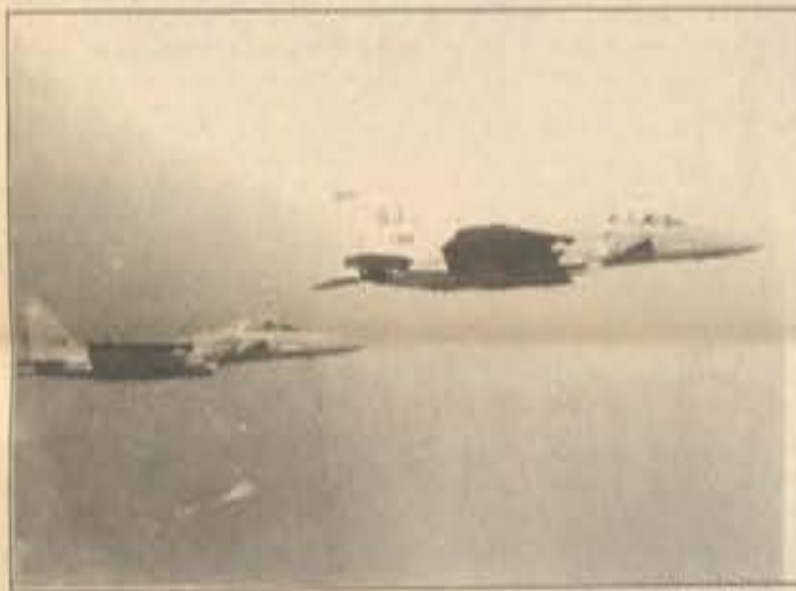
In contrast to other flight control systems, the IFPC system allows the pilot to use the throttle to change approach speed without disturbing his glide slope. Likewise, the pilot can use the stick to change his flight path angle without affecting airspeed. The greater flexibility of digital fly-by-wire technology makes it possible to expand the aircraft's performance envelope. The S/MTD is the latest in a series of aircraft in which MCAIR has installed fly-by-wire systems, starting in 1970 with the conversion of an F-4 to a fly-by-wire configuration.

Cockpit

The F-15 S/MTD takes advantage of the latest cockpit design found in the F-15E dual-role fighter, with technologies including programmable displays, color and monochrome cathode-ray tubes, an up-front controller and a wide-field-of-view head-up display (HUD).

The S/MTD, like the F-15E, will feature a Hughes APG-70 radar with a high-resolution ground-mapping mode and a Martin Marietta LANTIRN (Low Altitude Navigation and Targeting Infrared for Night) navigation pod with a forward-looking infrared (FLIR) sensor.

Pilot workload on landing ap-
see F-15, page B10



Father figure...

Many of the systems in the F-15 S/MTD cockpit originate from the newest F-15 version, the F-15E Strike Eagle. These two planes are the newest of the USAF arsenal.

Boeing 747 aircraft No. 1 retires

by Ron Young
Aeronautica Writer

The No. 1 747, christened the "City of Everett", recently entered retirement after 21 years of service as Boeing's flying test airplane.

The aircraft, the largest ever built for commercial use, was rolled out on September 30, 1968. This was followed with the initial first flight on February 9, 1969. The last certification flight occurred on December 13, and certification was obtained on December 30, 1969.

The following years saw the aircraft performing as a test bed for numerous upgrades and improvements. These programs began in 1970 with the development and implementing of a fail-operative autopilot, improved braking, an increased gross weight limit and the certification to carry a fifth engine for ferrying purposes.

Two years later, the 747 was used to demonstrate its ap-

plicability as an Air Force tanker with the addition of the Boeing "Flying Boom" refueling system. Also during this time frame, improvements in comfort and ride quality were introduced.

The next several years saw the craft being utilized for everything from new engine certification to improving noise technology to the testing of the 747 Short Range development program.

In October 1983, the airliner flew to Las Vegas, Nevada for three years in storage.

Following its use as the mock-up for the military's Air Force One program, the plane was utilized for 747 crew training up until March 1988.

Finally, on March 28, 1990, Boeing's red and white prototype ended its career with over 20 years of useful service. Nearly 800 aircraft produced remain as its legacy with production still continuing at Boeing Everett, Washington plant.

...on March 28, 1990, Boeing's red and white prototype ended its career with over 20 years of useful service.



Old and new...

The Boeing red and white 747 No. 1 is seen flying over a bustling metropolis along with its offspring, a 747-400.



Death from above...

The General Dynamics F-16 Fighting Falcon is currently under development as a close air support aircraft, and will possibly replace the A-10 thunderbolt in this role.

General Dynamics describes future F-16CAS development

General Dynamics is working on a wide array of advanced aircraft projects, looking into the 1990s and the next century. The range of the programs, being carried out at the company's Fort Worth, Texas, Division, promises a bright aerospace business future for both the near and long term.

The worldwide F-16 production effort continues as one of the most successful military aircraft programs in history. At the beginning of 1990, more than 2,500 aircraft had been delivered to 16 air forces. Indonesia received its first F-16 in 1989 and Bahrain has recently received the first of 12 of the aircraft it has ordered, bringing the current total of F-16

program participants to 16 countries. General Dynamics is currently delivering two F-16 versions, the F-16A/B and F-16C/D.

Deliveries of both are expected to continue well into the 1990s, exceeding 4,000 total aircraft. The designed-in flexibility of the F-16 has opened many avenues for providing tactical air power to the air forces of the United States and its allies. The worldwide F-16 fleet is performing in a variety of dedicated roles including air-to-air, air-to-surface, strategic air

defense, radar suppression, close air support, reconnaissance, U.S. Navy adversary, USAF aggressor, experimental testing and flight demonstration.

The worldwide F-16 production effort continues as one of the most successful military aircraft programs in history.

Meanwhile, General Dynamics is also looking ahead with other aircraft projects going beyond current F-16 versions and the current century.

Work is continuing at Fort Worth on future F-16 block versions and
see F-16, page B10

The Editor rates the top ten best programs

by Jason Simon
Data-Tech Editor

This being the final edition of the Avion for this semester, I felt that I should give you my top ten picks for software buys for this year.

Number 10: Ports of Call by Aegis software. This excellent simulation puts the user into the command chair of an international freighter company. The user's objective is simple, to amass the greatest shipping fleet and be profitable in his adventures. However, such interesting obstacles such as icebergs, coral reefs and suicidal ships that try to ram the users barge and cause severe damage. A very interesting game.

Number Nine: Batman by Ocean software. Batman actually contains two games in one. The user can choose to fight either the Joker or the Penguin depending

on what type of mood the user is in. The game is carried on just like a comic book; when Batman changes to a different screen the previous screen partially fades into the background while a new comic book panel appears in the foreground. The background music is excellent, but tends to be distracting

sometimes. In addition, some of the joystick maneuvers tend to be awkward.

Number Eight: Arkanoid Two, The revenge of the Doh by Imagine, licensed from Taito. This sequel to the original Arkanoid takes the excellent "breakout game with a twist" concept a step further. There are new capsules which can change the "ball" the paddle (known as a Vau) carries so that it can destroy even those pesky, formerly indestructible, gold bricks. The user can also choose from two escape routes when the level is completed, making every game different. But with the good comes the bad in the form of new ships that reflect the ball in new ways. Overall, this is one of the better games for home computers.

Number seven: The Jetsons: The Legend of Robotopia. This is a funny

Number Five: The Three Stooges by CinemaWare. This is about the comical adventures of Larry Moe and Curly. Their quest, to save an orphanage from foreclosure.

text adventure with a nice twist in the form of animated art and a host of stereo sound. In this game George Jetson must find out why two factions of robots on the planet Robotopia are feuding over a giant wall. One faction is building the wall and the other proceeds to

demolish what the others have done. This is a good game for Jetsons and non-Jetsons fans alike.

Number six: Rocket Ranger by CinemaWare. This is a good action game for science fiction and historian buffs alike. In this scenario the Nazis have won world War Two. A package arrives from the future in a flash of light in the users laboratory that tells of the conquest of the Nazis and that the user is to prevent it by using the special rocket pack. The user will fight Nazi guards, sharpshooters and fighter pilots to stop the Nazi conquest. Highly recommended.

Number five: The Three Stooges by CinemaWare. This is about the comical adventures of Larry Moe and Curly. Their quest, to save an orphanage from foreclosure. The stooges travel through stooge city trying to earn money through jobs they get. Although this program is funny, it takes forever to load certain scenes and has a tendency to take away from the overall program.

Number Four: Sword of Sodan by Discovery. Unbelievable graphics and sounds combined with an excellent game make this game one of my favorites. The user can choose between a hero or heroine to fight the quest and free their people. The game turns out to be very challenging and has a very tough surprise ending.

Number three: FA/18 Interceptor by

Electronic Arts. This program puts the user in the cockpit of an F-16 or FA/18 Interceptor aircraft. There are seven missions that the user can choose from. These range from a visual confirmation of an enemy aircraft to

With the slim exception of Super Hang On, one should avoid all adaptations of Sega games, such as Out Run and Thunderblade.

saving Air Force One from being shot down. Some drawbacks, the scenarios are mostly air based and the graphics could use some work. In addition, the user can actually fly the plane

backwards when he applies negative thrust, one of the major flaws in this program.

Number Two: Sim City the city simulator. This game, as the name implies, allows the user to be "mayor" of his simulated city. The user can watch as the city begins to prosper or into ruins using the simulated disasters packaged in the game. These range from small scale flooding to a Godzilla type monster attack.

Number one: FALCON, Operation Counterstrike by Spectrum Holobyte. This is by far the most realistic combat simulator available in the open market. Realistic cockpit designs and controls make the user feel as though he were actually flying the real thing. The user can also select from over ten

missions that are mutually dependent on each other. If you want the absolute best in simulators, this is it.

With all the good stressed in this article I must now stress the bottom of the barrel games that make one wish

that the money they had spend was still in their pocket. One of the companies that market the lowest of low games is ReadySoft and their line of Don Bluth Laserdisc adaptations of Dragons' Lair and Space Ace. If one like games that can be solved in a matter of hours at an enormous expense, over seventy dollars, then this is the company for them.

With the slim exception of Super Hang On, one should avoid all adaptations of Sega games, such as Out Run and Thunderblade.

These are nothing but cheap, thirty minute programming jobs that barely scratch the surface of the real games. Why would a respectable company like Sega want to tarnish their reputation with garbage like this?

Overall the good outweighed the bad this year. Despite the bad apples it seemed like a good year for these types of programs in general.

Staying for summer?

The Editor of the Data-Tech section is looking for writers. Whether your experienced or inexperienced, The Avion has a place for you. In addition to getting a chance to write what you want to write, there are many benefits and the position looks good on a resume.

For more information contact Jason Simon in the Avion office

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Monday-Wet T Shirt Contest

\$200.00 Cash, Free Drinks and Mugs from 6-8

Tuesday-Amateur Male Dance Contest

\$200.00 Cash from East Coast Gym & Baggy Boys Active Wear. 608 N. Halifax Dr. Free Drinks and Mugs from 6-8

Wednesday-Bikini Contest

\$400.00 Cash from Gallery Magazine. Swimwear by Jimmy Z from Bikini CO. 504 Seabreeze. Free Drinks and free mugs from 6-8

Thursday-Best Legs Contest

\$500.00 Cash from Nair. Free Drinks and free mugs from 6-8

Friday-Wet-T Shirt Contest

\$200.00 Cash from 20th Century Fox. Free Drinks and Mug from 6-8

Saturday-Female Best Body Suite Contest.

\$200.00 Cash from Jacques Moret Body Suits supplied by Jacques Moret. Free Drinks and mugs from 6-8

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Notices

Counseling Center Programs Spring 1990

Experience+Plus!

We are looking for "non-traditional" students who are interested in getting together with other such students to join our group called "Experience+" here at ERAU. A "non-traditional" student is defined as someone who initially entered college after a break of four years or more from academic studies. The purpose of this group is to form a supportive social network as well as to discuss issues that effect the "non-traditional" student. The group will meet for monthly luncheons.

If you are interested, please contact Lynne Norris or Patty Ruddy in the Counseling Center, 239-6035 for further information.

Free Information

The Counseling center has books and cassette tapes that can be checked out, plus many free handouts and brochures. The materials deal with numerous subjects such as stress reduction and relaxation, study skills, depression, grief, sexuality and relationships. The Counseling Center also has a biofeedback machine for stress reduction and video tapes that can be viewed in their Resource Room. The Counseling Center, located on the first floor of the Student Center, is open from 8:00 a.m. to 5:00 p.m., Monday through Friday.

Parking Policy

Effective immediately, all regulations concerning parking violations are being enforced for ERAU student vehicles and other vehicles.

University Bookstore

The University Bookstore cashiers are accepting orders for faculty/staff academic apparel for April's Graduation.

Graduating Seniors receive a reminder

If a prospective employer requests an official transcript for a job interview, we must have a written request from you before that information can be released. For your convenience, be sure to fill out a Transcript Request Form with the Records and Registration before leaving campus.

Students anticipating summer '90 degree completion

We suggest that you fill out your Degree Completion Application for a Preliminary Evaluation for Degree Completion. Your evaluation can be used to check that the courses you may have Advanced Registered for are correct. Any changes can be made before the summer terms begin.

Applications are available in the Registration and Records Office on the Second Floor of the John Paul Riddle Student Center Extension.

Fall '90 degree completion forms and ceremony attendance forms will be accepted in the office of Registration and Records at the beginning of the Summer A term. This will initiate a Preliminary Graduation Evaluation.

Scholarships Available

Applications for Orville Redenbacher's Second Start Program are now available in the Financial Aid office. Ten \$1000 scholarships will be made available to qualifying students for the 1990-91 school year.

To be eligible, the students must be 30 years old or older at the time of application. Recipients may enroll in either an associate, bachelor, or graduate degree program at an accredited college or university and can be either full or part-time students. The deadline for the application is September 1, 1990.

Library Exam hours for Spring 1990

| | |
|--------------------|---------------------|
| Thursday April 19 | 7:15 a.m. to 1 a.m. |
| Friday April 20 | 7:15 a.m. to 1 a.m. |
| Saturday April 21 | 8 a.m. to 10 p.m. |
| Sunday April 22 | 1 p.m. to 1 a.m. |
| Monday April 23 | 7:15 a.m. to 1 a.m. |
| Tuesday April 24 | 7:15 a.m. to 1 a.m. |
| Wednesday April 25 | 7:15 a.m. to 1 a.m. |
| Thursday April 26 | 7:15 a.m. to 6 p.m. |

Break Hours

| | |
|-------------------|------------------|
| April 27 to May 4 | 8 a.m. to 5 p.m. |
| Closed weekends | |

Due to the upgrade on the library computer system, the following schedule modifications are necessary: 1) All library material should be returned by Friday, April 20, 1990; 2) There will be no on-line catalog or automated circulation functions after Sunday, April 22, 1990. The card catalog will serve as the only access point to the print collection; 3) If there is a special need to keep materials past the due date, please see a staff member at the circulation desk.

We apologize for the inconvenience this schedule may cause. However, the system must be down for two weeks to complete the installation and testing of the new components. This plan will allow us to be back on-line by the first day classes for Summer A.

Graduating Seniors need Exit interviews

If you were awarded a Perkins/NDSL or Repayable Educational Assistance Loan (REAL), and a Stafford/OSL as part of your financial aid

FAA Pilot Written Exam Schedules

Embry-Riddle Aeronautical University will administer FAA Pilot and/or Instructor Written Examinations for the following:

| | Max No. of Questions/Times Allowed |
|--------------------------------------|------------------------------------|
| 1. (PA) Private Pilot - Airplane | 50/6 |
| 2. (CA) Commercial Pilot - Airplane | 100/5 |
| 3. (FA) Flight Instructor - Airplane | 100/6 |
| 4. (FOI) Fund. of Instruction | 50/4 |
| 5. (BGI) Ground Instr. - Basic | 100/6 |
| 6. (AGI) Ground Instr. - Advanced | 100/6 |
| 7. (ATP 121) Airline Trans. Pilot | 100/6 |
| 8. (AD) Aircraft Dispatcher | 100/6 |
| 9. (ATA 135) Airline Trans. Pilot | 100/6 |
| 10. (IRA) Instr. Rating - Airplane | 60/6 |
| 11. (FI) Flight Instr. - Instr. | 50/6 |
| 12. (GI) Ground Instr. - Instr. | 50/6 |
| 13. (FEB) Flight Engineer - Basic | 50/6 |
| 14. (FEJ) Flt Engr. - Turbojet - 727 | 50/6 |

| Date | Time | Place |
|------|---------------|----------------------|
| 4/24 | Tues. 9 a.m. | G-109 |
| 4/25 | Wed. 8 a.m. | G-109 |
| 4/26 | Thurs. 9 a.m. | G-109 |
| 4/27 | Fri. 9 a.m. | H-113 GRW Complex |

Students intending to take an FAA Pilot Written Examination are required to sign up in Office G-104 or call ext. 6830 prior to exam day, package while a student at Embry-Riddle Aeronautical University, you are required to complete an Exit Interview before leaving the University.

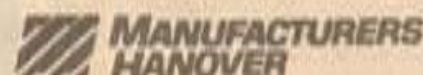
If you have not yet scheduled an appointment for your Exit Interview with the University Collections Office, please do so immediately.

Please call 239-6040 to make your appointment. Be advised that there will be a hold placed on release of your cap and gown for graduation until you have fulfilled your Exit Interview requirements.

Post Office offers Express Mail Service

The Post Office will begin offering Express Mail Service on April 9, 1990. A two pound or less package will cost \$8.75. The parcel must be turned in to the Post Office before 2:30 p.m. for next day delivery before 5 p.m. The delivery is guaranteed if the package meets the above parameters.

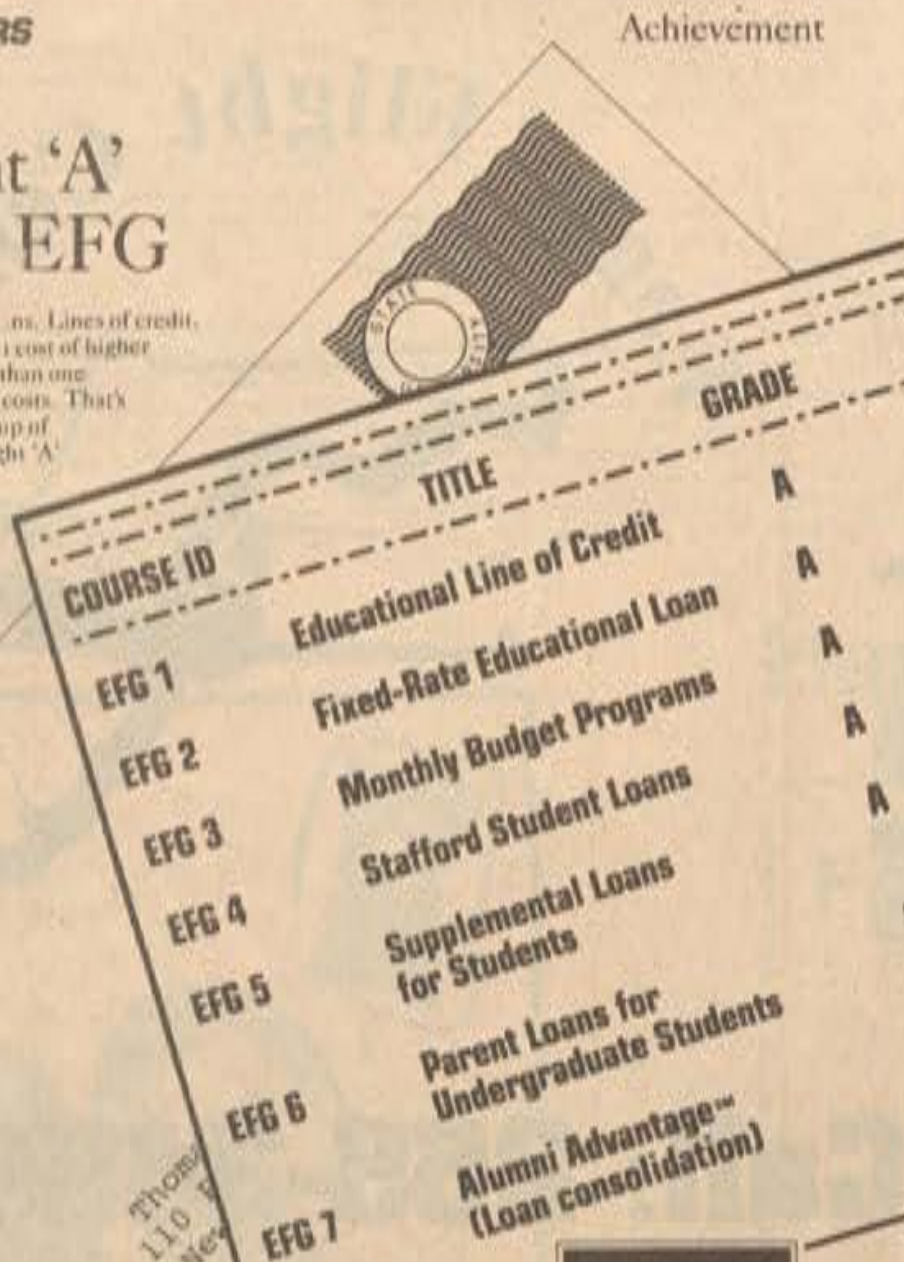
Congratulations to the class of 1990



Some straight 'A' options from EFG

Guaranteed Flexible educational financing why? Because Manufacturers Hanover lines up your financial future.

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Eagle Flight Center



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➔ Autos for sale

1977 Caprice Classic-2 dr., PS, PB, AC, CC, AM/FM Cass., V8, painted last summer. Fair cond. Must Sell. \$500 obo. See me at Dorm II room 256 (left).

1979 Celica GT-Reliable Transportation, cold air, sunroof, stereo. \$800 obo. Call 756-2526.

Attention-Government Seized Vehicles from \$100. Ford, Mercedes, Corvette, Chevy. Surplus Buyers Guide. Call 1-602-838-8885 ext. A18183.

1981 Honda Accord-4 door, AC, new brakes and tires. Must Sell \$500 obo. Call Mark at 760-2151 after 6 p.m.

1980 VW Rabbit-AC, AM/FM Cassette, excellent mileage, new battery. \$975. Call Jeff at 257-6126, leave message.

1987 VW Cabriolet-Kenwood stereo, AC, PS, alarm, real clean. Must sell, ordered new car. \$9500. Contact Ray at box 1118.

Fiat 124 Sport-Excellent for running around, very efficient. New Tires and radiator. 5 speed, convertible. \$550 obo. Contact Greg at box 7061 or Dm II, Rm 153.

1986 Renault Alliance-Automatic, AC, FM/AM radio. Must sell, graduating. Asking \$2300 obo. Call John at 253-9870 or box E-208.

1983 Dodge Charger-AC, fair cond. \$1200 obo. Call 258-0939, leave message.

1987 Tempo-Loaded, top cond. \$4300 obo. Call 23800939, leave message.

1982 Toyota Corolla-Good cond., super clean interior, new tires, 203-60 13's, 5 speed station wagon. Asking \$1500. Call Nisha at 238-6206 or box 5314.

1980 Scirocco-Gray, 2 door, 4 new tires, alarm system, very good running cond.\$900 obo. Call Howard at 760-7210.

1985 VW GTI-Black, fog lights, ground effects, all around car. Sun roof, new tires, AM/PM radio cassette, alarm, car cover. Call Ian/ilo at 238-7144.

1974 CJ5 304-White, good cond. runs well. Bikini top and headers in a box. Has Dana front and rear end. Has 31 in. tires on wagon wheel rims. Asking \$3200 obo. Call Kevin at 255-8646, leave message.

➔ Cycles for sale

1979 Kawasaki KZ 1000-2 new tires, 4 to 1 Kerker, shaft drive, good cond. Still pretty fast. \$750 obo. Call Chris at 254-8830 or Kipp at 252-6728.

1982 Honda 450-Automatic, exc. cond., garage kept, extras. Reliable, clean, perfect first bike. \$600. Call Mike at 673-5745 or box 2752.

1988 Honda VTR Interceptor-Excellent cond., 2000 mi., must sell. \$2500 obo. Call 676-9361.

1980 Suzuki GS 450-Black, 14000 mi., run great. Asking \$150. Call John 253-9870 or box E-208.

1987 Yamaha XT-600-900 original miles, mintlike sahara enduro tires, Acerbis hand guards, super clean. Asking \$2000. Call Nisha at 238-6206 or box 5314.

1989 FZR 1000 Yamaha-Slip-on header, custom seat and grips, 8000 mi., cover included. \$6000. Call John at (407) 327-7831 or 257-7831 or box 6720.

1986 Ninja 600-Just tuned, New Metzlers, never down, runs strong, great cond. \$2100 firm. Call John at 254-6863.

KZ 650-Great Shape, must see. Asking \$700 obo. Call Joe at 238-7422.

1981 Yamaha 250 cc Blazer-New battery, strong engine, 5 speed, 4500 miles. Reimber Insurance is not required for motorcycles in the state of Florida. First \$220 takes it obo. Leaving. Call Ray at 788-3095 weekdays before noon or after 6 p.m. or weekends all day.

➔ Roommates

Roommate wanted-Male or Female, 2 bedroom-2 bathroom Cypress Landings, \$270 mo. Call 257-6951 after 4 p.m.

Apartment for Rent-Take over lease (expires 8-14-90). 2 bedroom, 2 bathroom. \$539 mo. Call 257-6951 after 4 p.m.

For Rent-Available April 1. Clean, furnished, quiet room in a beautiful big home. Plenty of parking space, lighted at night. \$180 mo. and you pay no utilities. No lease either. Must be a non-smoking, quiet, sober gentleman. 1.5 miles from BRAU. Call 258-5901, evenings.

For Sale-Good Buy. 8 rooms, 3.5 baths, living and dining rooms, kitchen, attic, cellar. Very dry, big, beautiful, historic landmark. Professional zoned and residential. \$110000 cash. Call 258-5901, evenings.

New Home-2 bedroom, 2 bath, split plan, many extras, \$59900. If you buy now and sell at graduation you can live rent free or take a roommate and make a profit. 920 Hartford Ave. between 9th and 10th street, east of Ridgewood. Call Nancy at Adams Cameron, phone 677-7911.

Apartment for Rent-Sublet clean 2 bed, 2 bath apt. from May thru July, security, pool, tennis court, laundry, air cond. 1 mile from BRAU, unfurnished. \$440 mo. plus deposit. Call Alexa at 253-0427 from 6 to 8:30 p.m.

Roommate Needed-Non-smoker only, starting Summer A. Nice 2 bedroom furnished apt. with washer and dryer, hot tub, pool, tennis courts, cable. \$259 mo. plus phone and elec. In the Island Club 3 mi. from BRAU. Call Jeff at 760-7417.

Roommate Needed for Summer A and B in 3 bedroom, 2 bath house. Call 676-2909.

Room for Rent for Summer A and B. Brand new house in very nice Port Orange neighborhood. Own bedroom, bathroom, and garage parking. \$200 mo. plus third of utilities. Call Tony at 760-7078.

For Sale-Mobile Home, 12 feet by 60 feet, in Port Orange family park, good cond. Furnishings neg. Park amenities include swimming pool, tennis courts, children's play ground. Call Laurie at ext. 6639 (days) or 767-9834 (evenings). \$9750 takes all.

Town House for Lease-From May to August. Need 2 people. Rent \$400 mo. Call Howard at 760-7210.

Roommates needed for Summer term. Large, 3 bedroom, half furnished house located half mile from school, next to DHCC. Call Ian or Cesar at 252-9292.

Roommate needed for Summer to share 2 bedroom apt. overlooking Halifax Harbor. Close to Beach and School, clean and comfortable. \$200 mo plus utils. (water and cable inc.). Call Mark at 252-6247 or 6317.

Roommate wanted to share apt with 2 other guys, for fall and spring sem. '90. Preferably ROTC. Contact Chris C. at box 3329 or Jim H. at box 6888 ASAP.

Room for Rent-One of three bedroom house. Located 4 mi. south of BRAU. \$185 mo. plus fourth utilities. Central AC, HBO and Showtime, free Hobie sailing lessons for early birds. Call Jeff at 767-5917 or box 4127 for more details.

Room for Rent-1 year old house 5 miles from school. Dishwasher, microwave, washer/dryer, AC, ceiling fans in every room, clubhouse with pool. Available immediately, either flat rate or split bills, your choice. You get a master bedroom with private bath. Call Jeff at 760-1861.

Roommate wanted to share RiverPoint Apt. 2 bdr, 2 bath. \$210 mo-10 min. from BRAU. Call Mark at 760-2151 after 6 p.m.

Roommate Wanted-Very nice, 3 bedroom house by the beach, only 3.5 mi. to school. Fully furnished. \$150 mo., \$100 deposit. Neat, quiet, non-smoker a must. Call Jim at 252-5907. Available now.

Citation Jet Time-Become Citation jet qualified. Includes jet systems ground school, advanced crewmember training, jet flight time and all materials. When finished you will be signed off and Citation Jet co-pilot qualified. \$995 guaranteed. Call 253-2378 or (407) 330-4670.

I need a witness to an accident that occurred Monday, March 26 at 4 p.m. at the intersection of Clyde Morris and Catalina. Please. Call Eric at 239-6811 in Flight Maintenance.

Lost-1 weight lifting glove. Rafael Daniels. Blue back and and grey leather front. If you have the glove or know where it is, please call Jim at 255-4660 or box 5427, leave a message.

Attention All Scooters-If you are interested in getting involved with local Scout troops or Explorer Posts either now or in the Fall please let me know. The local OA chapter is in need of responsible help of all ages. Call Duane Bird at 239-9672 or box 8020.

Need a paper typed? Let me do it for you. Typed, Spelling and grammar corrected, only \$1 a page. Call Man at 255-3057, leave a message.

Attention-Heavy Work. Excellent Pay! Assemble products at home. Details. Call 1-602-838-8885 ext. W-18183.

Attention-Hiring! Government jobs - in your area. Many immediate openings without waiting list or test. \$17840 to \$69,485. Call 1-602-838-8885 ext. K18183.

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.
- ➔ 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.

➔ Miscellaneous

Found-Leather Jacket. If you lost one. Call 767-8411.

Free to a Good Home-One white angora rabbit. Also free, his cage, water bottle, and food dish. Call Tara at 257-6477 and leave a message.

I need a ride to Benton. Please call Mike at 756-0464.

Wanted-Baby Rabbits. Don't know what to do with your Easter Rabbit? I do. I have a hungry maw. Call Ian at 258-7140.

German Car Repair-Professional service on VW, Audi, Bug, Rabbit, Golf, Scirocco, GTI, Jetta. Factory trained, 10 yrs. experience. Suspension, struts, brakes, C.V. joints, Bosch injection, routine maint. and overhaul. Only \$14 per hour labor for BRAU students and faculty. No mark up on parts, will install your parts or mine. Call Robert Warlick at 238-0386 or box 2193.

➔ Misc. for sale

For Sale-Linden HA-2510 Ham Radio and FCC study guide with more code study tapes. Radio is brand new. Call Brian at 760-7500.

For Sale-Sun glasses, Gargoyles. The finest money sunglasses you can buy. Retail at Volusia Mall for \$70. I will sell them to you for the low price of only \$30, over 50% off. Brand new never worn case and black band included. Black frames. Contact Brian at box 7782.

For Sale-Canonade 12 speed Road Bike. \$400 obo. Contact Jeff at box 5305.

For Sale-Light brown couch. Very good cond. Seats 4 comfortably. Only \$50 neg. Contact Dorm II, Room 211.

For Sale-Graduating Must Sell. Desk, bookshelf, table and chair, lazy boy rocker. Best offer. Call Scott at 767-9005 and leave a message.

For Sale-12 speed Meridian bike with lock and chain. \$50. Desk. \$10. Kitchen table with glass tops, 4 chairs. \$60. Call Tassos at 322-0524.

Must Sell-Need money for appendix transplant. Baron stritcher, VW Bug radiator, left handed smoke shifter, metric crescent wrench, lawn frisher (hardly used), lefty hammer, 1 gallon prepwash (unopened). Contact Steve R. at box 8144.

For Sale-Phone Modem. IBM PC or compatible. Call Jeff at 767-5917.

For Sale-Computer software; brand new Word Perfect 4.2 with manual, \$100 Wordstar 2000 with reference guide, \$75. Call Paula at ext. 6241 8 a.m. to 5 p.m.

For Sale-Brown swivel rocker chair in excellent cond. \$50. Call Paula at ext. 6241 from 8 a.m. to 5 p.m.

For Sale-Stereo. 70 watt Technics receiver, C.D. player, equalizer, Energy 275 watt speakers, and cabinet. \$700 obo. Call Rick at 767-2533.

For Sale-Sony Portable CD Player (D-25). 4 times oversampling and more. \$200. Call Francis at 257-4067 or 252-5434.

For Sale-Nintendo Gameboy and 4 cartridges. \$90. 1 in. BW TV, \$70. Call 756-1932.

For Sale-2 beds, Microwave oven, table, chairs, and other furniture. Call 760-7444.

For Sale-Computer Keyboard, Keytronics 101 keys, new, For IBM XT AND AT or compatible. Half price. I have two and only need one. Call ext. 6722 or 761-9184.

For Sale-Demon or \$258. \$250 obo. Yamaha CDX520 CD player, \$210 obo. Infinity RS3001 speakers, \$240 pair, obo. Call Doug at 788-4806.

For Sale-Kitchen table and chairs, living room set, lamps, bookshelves. Call Howard at 760-7210.

For Sale-Queen Size Waterbed. Heated, 6 mos. old. Must sell before April 24. Contact box D-203.

For Sale-Instrument and Commercial Flight Training. VHS tapes \$50 each set, toaster oven \$30, kitchen table/chairs \$100, chair loungers \$5 each, bath tub jacuzzi \$50, garden tools \$5, soft side water bed \$300, military gear, plus more. Call Jim at 252-5907.

For Sale-Motorcycle Helmet. New, Asking \$30. Call 239-6875 after 6 p.m.

For Sale-Pyle A 400 Car Stereo Amp. Good cond. Best offer. Call 253-5518 even. or box 7546.

For Sale-1 set of four model items 3 to wedge and sand iron. Set of Lee Trevino metal woods (1-3-57). \$125. Good cond. Call 257-2360.

For Sale-Rare colored 8 piece pit group, vidour good shape, \$100 obo. Solid oak coffee table, \$25 obo. Call Tim or Cathy at 252-3992.

For Sale-Enable book and disks. \$25 obo. Paid \$53. Call Joe at 761-4880.

For Sale-1 six drawer dresser, 1 three drawer chest with mirror, 1 desk with chair, and hutch, 1 twin bed frame with head foot board and trundle, \$500, 1 king bed with frame \$150, all furniture is stained pine with black slat tips. Call 672-0414 even.

For Sale-23 B. Cobra Cuddy Walkaround, Johnson 175 hp O/B, head, bait wells, horn, chain recorder, VHF, fighting chair, and more. \$10500 obo. Call 672-0414 even.

For Sale-Sony Stereo Turntable with linear tracking, speed display, direct rev. Fully auto. and Marantz Stereo Amplifier. \$300 total obo. Call Kevin at 760-6152.

For Sale-Two mission 100 watt speakers \$200 obo. Call Kevin 760-6152.

For Sale-Kenwood 5 piece stereo set with case, excellent cond. only \$250. Avstar, excellent cond. \$25. Honda line Magnete Tank bag, hardly used, great cond. \$35. Standard size waterbed with shelved headboard and padded sides with heater. good cond., \$75. Town and Country Surfboard, 5 ft. 8 in., good cond. only \$100. Call Kevin at 255-8646.

For Sale-Graduating. Desk \$50, Two single beds \$30 each, Two night stands \$20 each, Two table lamps \$10 each, TV 20 in. \$80, dresser \$40, sofa and matching arm chair \$140, type writer with spell checker and disk. It is also a printer \$250 (\$550 original). Color monitor \$200. Will take best offer. Call 760-0744 after 6 p.m.

For Sale-keyboard \$50. Yamaha PSR plus power pack. Call Conrad at 767-1955.

➔ Personals

TO SANDY,
I've loved econ class. Have a great Easter and enjoy D.C.
FRIENDS, THE MAD WRITER

FOXY FLIGHT GAL,
You complement is graduating. Why don't we get together. Or even become better friends.
THE BACK RUBBER

When you look and love, and it doesn't work out. Someone who listens and cares may be waiting in the wings. Give me a sign and I'm yours.

PHOENIX AND AVION MEMBERS,
Watch out. Bino's on the War Path.
THE GUNFIGHTER

MOLLY,
Last week was great, I'm looking forward to a lifetime more. I love you.
YVES

CONGRATULATIONS MOLLIE,
Have a happy citizenship.
THE MENTALLY ILL SNOWBOARDER

BRIAN
You're getting old! (Have a happy b-day).
RENEE

PENELOPE,
Since it isn't easy being green, try not to be green in the car. Hope you enjoy the Burgh.
MAYNARD

TO MY PERSONAL JESUS,
Hear my prayers.
SOMEONE WHO CARES

E=MC²
xy3 2/3 = 5
N=8 1/2 74
74.

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255-7701

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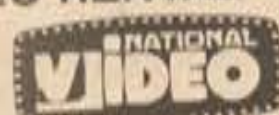
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Calvin and Hobbes

by Bill Waterson



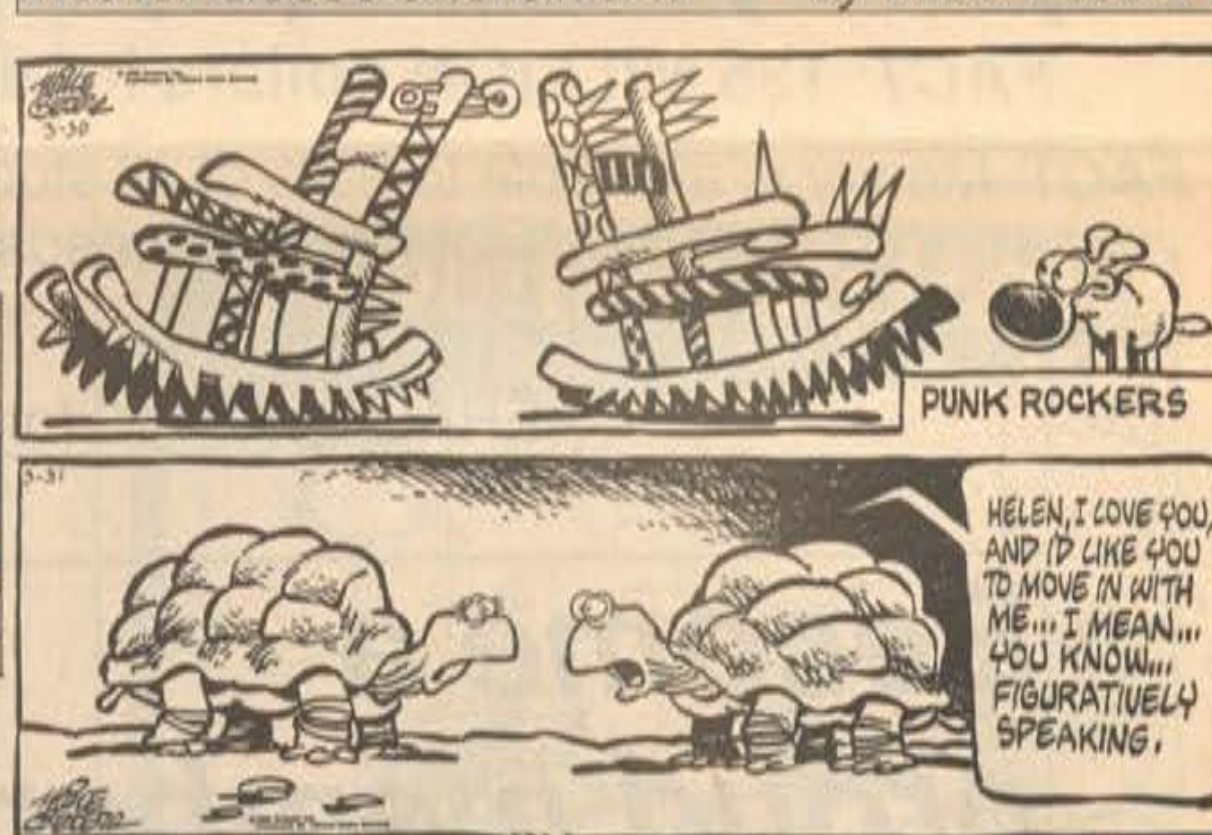
Far Side

by Gary Larson



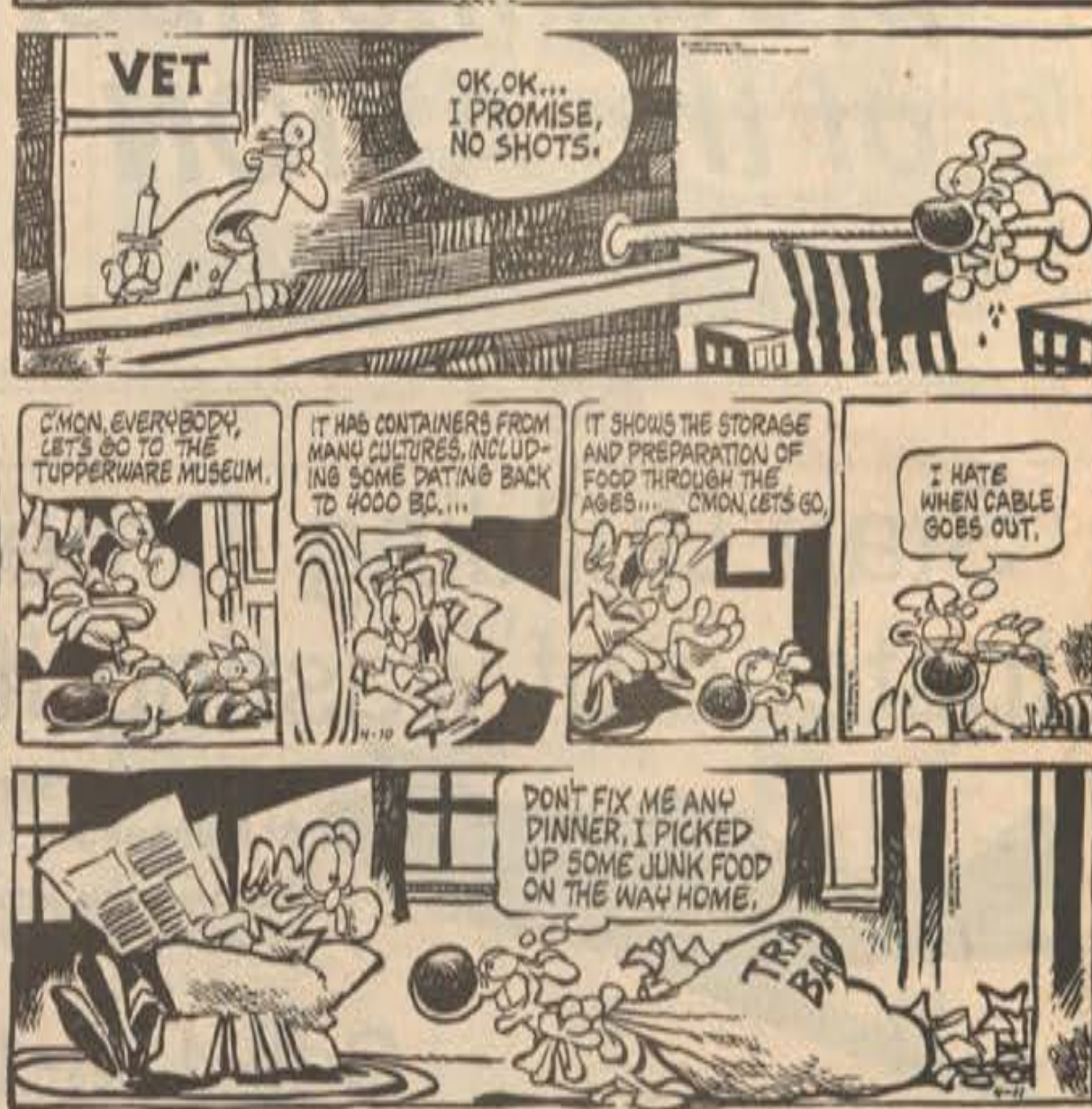
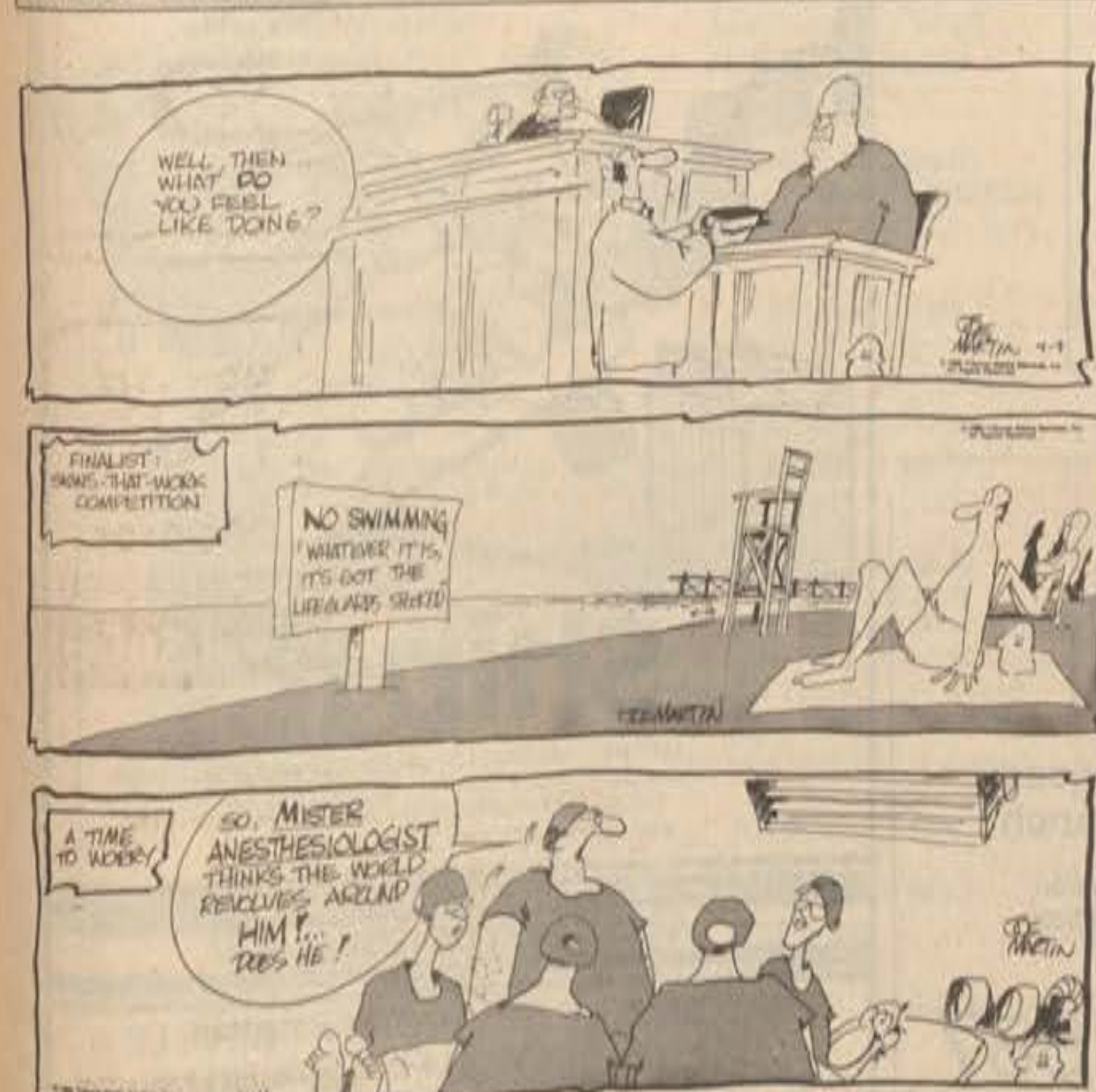
Mother Goose and Grimm

by Mike Peters



Mister Boffo

by Joe Martin



Busey

(continued from page A1)
crowded skies and airports." He responded simply, "essential." "General Aviation provides us the promise and the growth of U.S. aviation in the future."
Busey did cite a mid-air collision that occurred Monday involving an Atlantic Southeastern Airlines EMB-120 Brasilia and a Cessna 182 near Gadsden, Alabama. Both occupants of the 182 were killed in a fiery crash.
Admiral Busey also took time out to recount an impressive series of accomplishments. Busey served in the Navy for 37 years before retiring to become FAA administrator. While an active Navy Admiral he participated in NATO, which he referred to as more of a "social organization than it is a military organization."

Another of his accomplishments was to participate in the introduction of the F/A-18 while acting as a Wing Commander in the Navy.
Busey, who pilots the FAA jet used for his visits, takes a very

tough stand against the use of drugs in the cockpit. "There is simply not room in the cockpit for those (people) using drugs and booze."

Busey mentioned airport security as one of his primary initiatives. An FAA team currently is attempting to secure the Port Au Prince airport after an attempted hijacking of an American Airlines plane, a couple of weeks ago. All American flights to that city are currently suspended, according to Busey.

Phil Woodruff, an FAA Division Manager and Director of Aviation Education, accompanied Busey on his visit. Woodruff is an Embry-Riddle alumni who received his first degree in 1969 before going to work in both the private and public sectors. Woodruff described his present role as that of a "career bureaucrat."

Woodruff outlined a recent FAA decision to allow airlines to escape fines in the event that inadvertent maintenance lapses are reported promptly. Woodruff was also asked what he thought should be done to improve the "route from student pilot to airline/commercial pilot." "The answers are in terms of training...and I think they are doing a lot of that right here at Embry-Riddle."

Virus

(continued from page A1)

In addition, the virus has been detected on a few student disks in the computer lab.

In the process of looking for the Jerusalem B virus, Evans also found another virus called the "Yale/Alameda" virus, but this virus is not widespread and has been found in only one isolated case.

According to Walter Gaines, electronic data processing technician, computers in Spruance Hall were unaffected by the virus.

Steps have been taken to prevent future damage. According to John Vahn, manager of the academic computer lab, a permanent virus detector program has been installed into all of the computers in the microprocessor labs.

This virus detector checks for any one of 60 well known viruses before any potentially infected

program is loaded into memory.

The virus detector only detects already known viruses, thus the possibility remains of infection from new viruses.

The only sure way to avoid viruses is to buy and use only commercial programs, which are carefully scrutinized before release.

Other suggestions include, avoid sharing disks and programs, and never insert a disk into a computer that is on since the virus could be sitting in RAM. A quick reboot of the computer can help. And finally, use your own DOS disk to "boot" the computer, or at least, use a DOS disk with the write protect tab installed.

The write protect tab prevent any writing operation from taking place, eliminating the possibility that the virus appended to a file.

Virus detector programs are available on BBSs (bulletin board systems), but commercial detectors are recommended.

F-16

(continued from page B2)

cal Aircraft (ATA). The A-12 is proposed as a replacement for the A-6, the Navy's current carrier-based, all-weather medium attack airplane. The A-12 will exhibit significant performance improvements, particularly in the area of survivability.

General Dynamics is also teamed with Boeing and Lockheed in competitive development of the Advanced Tactical Fighter (ATF), which will replace the USAF's F-15 in the high-altitude air superiority role. The team is constructing prototypes that are scheduled to begin evaluation flights in the early 1990s.

In addition, the Fort Worth Division is part of the U.S. team, work-

ing on development of the X-30 National Aero-Space Plane (NASP), an experimental vehicle which will use air-breathing propulsion to operate at hypersonic speeds in the upper atmosphere or accelerate into Earth orbit after taking off from a conventional runway.

Materials technology is an important part of this project, with the Fort Worth Division concentrating its efforts in the area of carbon-carbon structures.

Other aircraft programs at the Fort Worth Division include continuing support of F-111s, interdiction aircraft which are now in their second decade of service with the USAF and Royal Australian Air Force. The expected service life of the F-111 extends past the year 2010.

F-15

(continued from page B2)

proach

will be reduced with these components, and with the APG-70's high-resolution ground-mapping mode, a pilot can spot an airfield from great distances, viewing an image that is clearer and sharper than that of any other radar system.

As the aircraft nears the airfield, the LANTIRN's navigational FLIR will project a television-quality image of the airfield onto the HUD. This will provide the pilot with extra situational awareness during night operations that limit normal visibility.

The pilot will be guided to his designated touchdown point by symbols superimposed over the infrared image displayed on the HUD. It has been shown in flight tests that pilots can easily interpret the symbols and follow their guidance to precision landings without active ground-based navigational assistance.

Landing gear
Modification to the production F-15's landing gear was required to make the F-15 S/MTD capable of landing on a short, bumpy runway. It is difficult to notice the changes when

comparing the two planes side by side, as only eight internal parts of the F-15 main landing gear had to be changed to make it capable of performing the S/MTD mission.

The U.S. Air Force requires McDonnell Douglas to show that the S/MTD can land on a wet, bomb-damaged segment of runway measuring no more than 50 feet wide by 1,500 feet long, a patch of ground about the size of an aircraft carrier's flight deck. Landing techniques, therefore, will be similar to those used for carrier-based fighters.

Instead of easing onto the runway at a descent rate of one or two feet per second, the S/MTD will descend at eight feet per second. Ground tests have already demonstrated that the F-15 S/MTD's modified landing gear is capable of withstanding landings at descents of up to 12.5 feet per second.

As the S/MTD proceeds through its landing rollout, it will encounter bumps as high as 4 1/2", simulating bomb craters that have been filled in by ground crews. Here, too, ground tests have successfully demonstrated the F-15 S/MTD's landing gear. Cleveland Pneumatic, which makes F-15 landing gear, handled the modifications for the S/MTD aircraft.

Freedom

(continued from B1)

will use a spring-loaded pallet to push the pieces into space to make room for another strut. It was meant to be constructed like a Tinker Toy, by placing the strut into the joint and twisting it in place.

The astronauts will work a total of 24 hours, six hours each and it will never exceed 36 hours unless an emergency arises.

For the first flight, astronauts will build 30 feet of truss out of the payload bay and will attach four solar array panels. They will also add a work platform for future shuttle astronauts to work on.

The second flight will involve extending the solar arrays and the spring-loaded pallet will run along the space station's backbone.

Future flights will assemble the portable atmosphere of the space station, the docking module and boosters to help achieve a higher orbit.

By June 1996, the shuttle will bring the U.S. laboratory module. They will work aboard the space station, but will not live there.

On flight nine, the shuttle will bring

two resource nodes which will be the command and control center for the space station's propulsion, tracking and guidance systems and will the astronauts to pass through to the other modules.

There will be a total of four nodes and two will be fitted with a "cupola" which extends out into space. On one side, it will face the Earth and on the other it will face the universe. This will give the astronauts a 360 degree view of outer space and will have eight windows.

In 1997, the shuttle will bring the habitation module which will be the living quarters for the astronauts. The MSS will take the module out of the payload bay and the astronauts will bolt it into place.

By the summer of 1997, the first permanent crew will arrive to live and work for the next three months.

In February 1998, the Japanese Experiment Module (JEM) will be added to the space station. After that, the European Space Agency will place their own module called Columbus onto the space station.

By August 1999, Space Station Freedom will be fully assembled with all the supplies needed for the eight people who will live and work in space.



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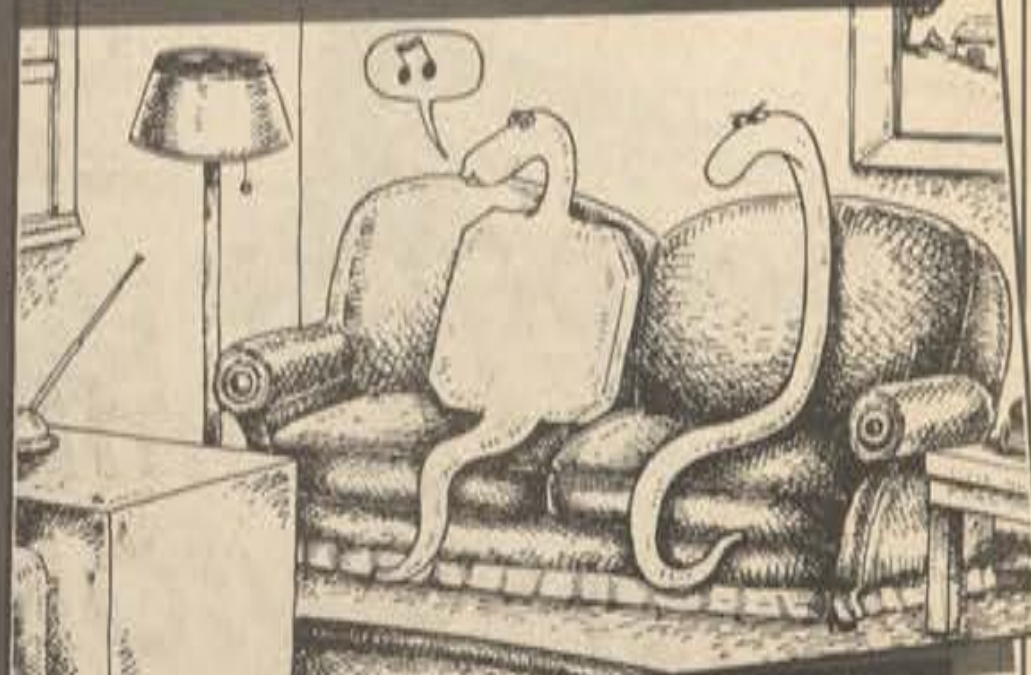
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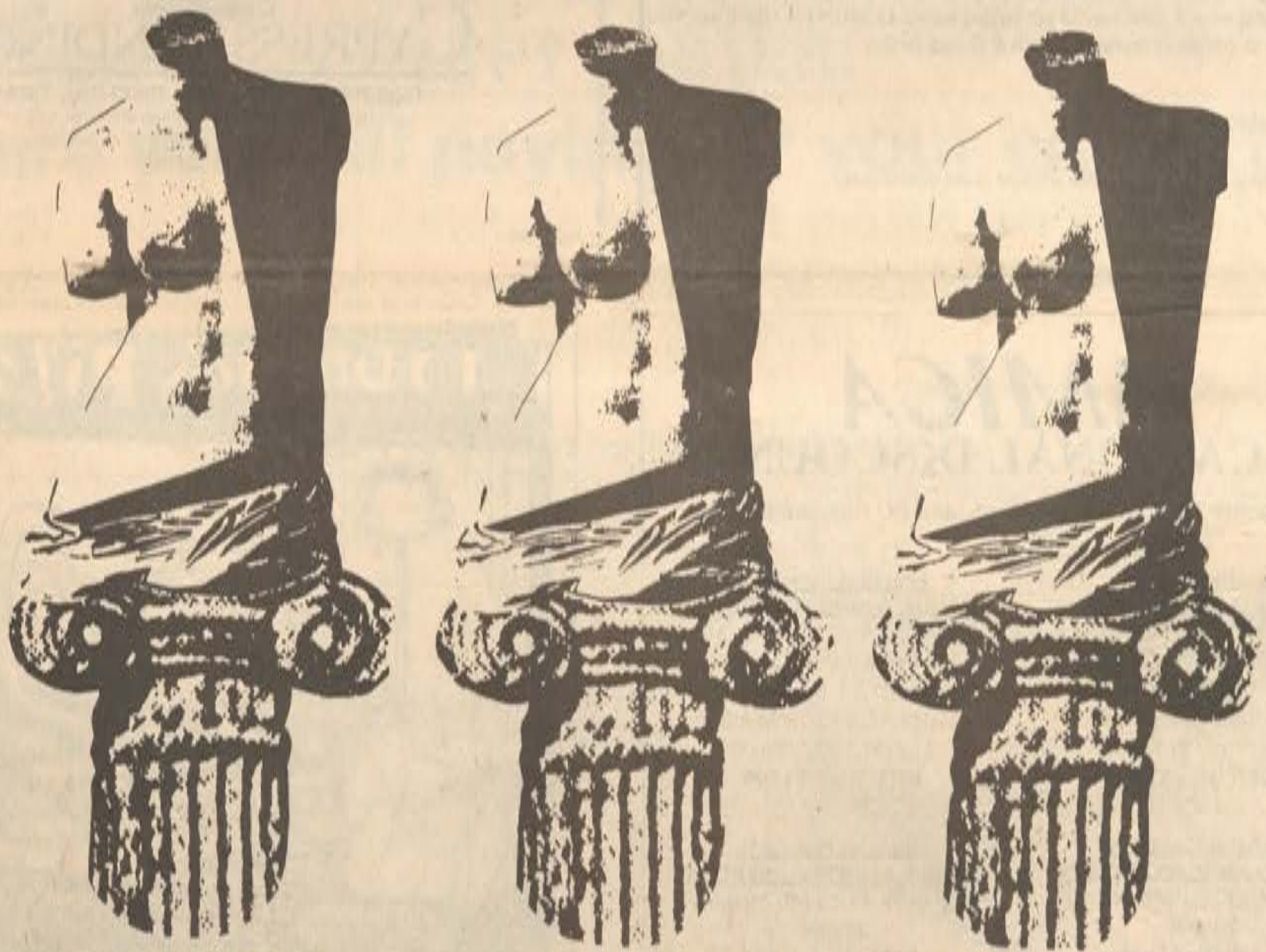
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