

3-7-1990

## Avion 1990-03-07 (B)

Embry-Riddle Aeronautical University

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## Space Technology

B

March 7, 1990

Volume 64, Issue 7

### Atlantis completes secret mission

by Derrick Seys  
Space Technology Editor

After numerous delays ranging from weather to crew health, the Space Shuttle *Atlantis* was thrust into space by its rocket engines and began a four-and-a-half day mission that deployed a \$500 million satellite for the Department of Defense.

Lift off of STS-36 occurred early last Wednesday from the Kennedy Space Center providing an illuminating site for most of the eastern seaboard. The spec-

however, further review showed a small hydraulic leak in the orbiter's aft compartment. The leak posed no problems and is being investigated an agency spokesperson said.

The crew then returned to Houston for debriefing, and *Atlantis* will be prepared for return to KSC. The ferry ride will be started Saturday of this week if the weather cooperates.

Monday brought on the beginning of a new mission for the National Aeronautics and Space Administration.

*Discovery* was rolled from the Orbiter Processing Facility to the

**After a brief stay in space, Atlantis rang California's clear skies with a sonic boom**

the main engines followed by the solid rocket booster firing.

The classified payload was deployed approximately 24 hours after lift off. It is assumed to be a satellite with a combination of abilities. The 37,300 pound device is to provide surveillance photos as well as monitor Soviet communications.

After a brief stay in space of less than five days, *Atlantis* rang California's clear skies with a sonic boom. The five man military crew returned from the heavens. At 1:09 EST pilot John Casper and commander John Creighton brought *Atlantis* to a smooth touchdown on runway 23 at Edwards Air Force Base.

The crew departed the orbiter approximately one hour after the wheels stopped. After examining the orbiter for damage, the commander complimented the shuttle, the crew, and all of those that contributed to the success of the mission,

massive Vehicle Assembly Building to meet its previously stacked solid rocket boosters and external tank.

After the mating of the orbiter, the entire assembly will be rolled to Launch Pad 39-B. Roll-out will occur Friday if all the interface checks pass.

*Discovery* will carry the Hubble Space Telescope (HST) into orbit. The observatory will be placed in a 300 mile high orbit and will be launched no earlier than April 12. The lift off is scheduled to occur near 9:00 a.m. EST.

The HST is the first of the four great observatories to be launched this year. The Astro observatory is to be deployed this May, and *Ulysses* will be launched toward the sun in October.

The final great observatory will be the Gamma Ray Observatory to be launched late this year in November.



**Moon man...**

The officers of the Society of Commercial Aviation Technicians (SCAT) pose with Rex Shaffer second from right. He spoke about lunar bases and their construction at the groups last meeting.

### Lecturer discusses the prospect of a lunar base

by Derrick Seys  
Space Technology Editor

The moon may provide man with a permanent home to live, work, and explore according to Rex Shaffer Senior Manager of McDonnell Douglas' Planetary Operations at the Kennedy Space Center.

Mr. Shaffer spoke to a group of approximately forty students last week on the future of lunar exploration and the challenge of a permanently manned base. The group consisted primarily of the Society of Commercial Aviation Technicians (SCAT) the sponsors of Mr. Shaffer, although several non-members were present.

The discussion encompassed all aspects of establishing a lunar base. It ranged from the difficult problems that existed, their solutions, the environment, and the simple problems that are often overlooked. He stressed the importance of human interaction for the base to operate.

A two year study by the National Aeronautics and Space Administration into the feasibility of human presence has shown that although robots could be used, their inability to make judgement decisions is limited. In a place where the time to transmit and receive data takes almost two minutes, this can be critical.

Using a manned base does promote problems. "The problem is launching and landing from the moon with only four people," said Mr. Shaffer. Adding that NASA uses approximately 15,000 to launch the Space Shuttle.

He also felt a prerequisite for the manned base is the Space Station *Freedom*. From *Freedom*, we may gain technology to assist in lunar exploration and it will also be used as a stepping stone for trips to the Earth's natural satellite.

This would lead to the development of a permanently manned lunar base sometime around the second decade of the twentieth century according to the speaker.

One possible configuration for the base would be formed from fabricated cylinders similar to those used in the construction of *Freedom* and carried into space by either the Space Shuttle or a new heavy lift launch vehicle.

Deposited at *Freedom*, the modules would be transported from low Earth orbit to low lunar orbit (LLO) by a specially designed vehicle. Then, a lunar landing vehicle would be used to transfer the cylindrical objects from

LLO to the grey surface.

On the surface, workers would use construction equipment similar to that on Earth and place the cylinders into position. After being positioned, the modules would be covered with lunar soil to protect the inhabitants from the harsh lunar environment where it can get so cold the behavior of the tails has to be addressed.

"The environment poses a whole myriad of problems," said Mr. Shaffer. The soil will also protect man from the cosmic rays that do not get filtered from the atmosphere as done on Earth.

As time progresses, the base will develop from the experimental stage to the third final operational stage. Here, the activity was summarized by Mr. Shaffer as "really going hog wild."

A thirty man crew will spend up to two years at the lunar outpost possibly formulating new materials, operating green houses, exploring the surface, and making astronomical observations. Additionally, lunar scientists would manufacture liquid oxygen from the moon's regolith. It would be used to fuel the transport vehicles back to Earth.

**"The environment poses a whole myriad of problems,"**

**Rex Shaffer, McDonnell Douglas**

Moon rocks have a significant amount of oxygen trapped in them and would greatly enhance the base if utilized.

When questioned if the effort would be multi-national, Mr. Shaffer commented "the option is being explored, but we don't want to depend upon one from keeping us from doing what we desire." A joint effort would reduce the cost of the mammoth program, although he continued, "I have no idea of the cost."

The base would be a technological achievement and lead to future manned exploration of the galaxy. Mr. Shaffer when asked if he thought it was wishful thinking, said "it all depends upon money."

Rex Shaffer's duties with McDonnell Douglas concern looking at lunar launch and landing operations. He is the step-father of ERAU student Ken Whalen.

SCAT is a recently formed campus organization open to all students, faculty, staff, and alumni interested in Aviation Maintenance. The purpose of the organization is "to promote professionalism and fellowship among Aviation Maintenance students as well as the sponsoring of events to increase awareness of existing employment opportunities." They may be contacted through the office of Student Activities.

**Finally...**  
The Space Shuttle *Atlantis* lifted off after numerous delays last week on a mission dedicated to the Department of Defense.

### Soviets challenged American moon shot

by Marianne Michaels  
Space Technology Writer

Three months ago, American aerospace engineers visited Moscow and under the new policy of glasnost or openness, the Soviets admitted that they were planning a lunar landing on the Moon.

Soviet engineers showed the Americans for the first time a Soviet spacecraft that was planned to go to the Moon in 1968.

The reason that it never got off the ground was because of repeated failures and numerous explosions of the heavy-lift N1 launch vehicle. One of the accidents killed some workers on the launch pad.

The N1 is approximately 48 feet in diameter and 300 feet tall and produces approximately the same thrust created by the U.S. Saturn V.

For years, the Soviets had denied that there had been a race to the moon.

The Soviets were planning to go either of two ways:

One called the Earth Orbit Rendezvous (EOR), would have involved two launches: one for a two-man crew launched by a Proton rocket and another for the fuel, rockets, and the lunar lander would have been launched by the N1. The two would rendezvous in Earth orbit and then onto the Moon.

The second approach, called the Lunar Orbit Rendezvous (LOR), involved sending a mother ship and a smaller craft into lunar orbit. This was the process they intended to use if they decided to go.

The rest of the mission would have been the same as the U.S. Apollo missions with the

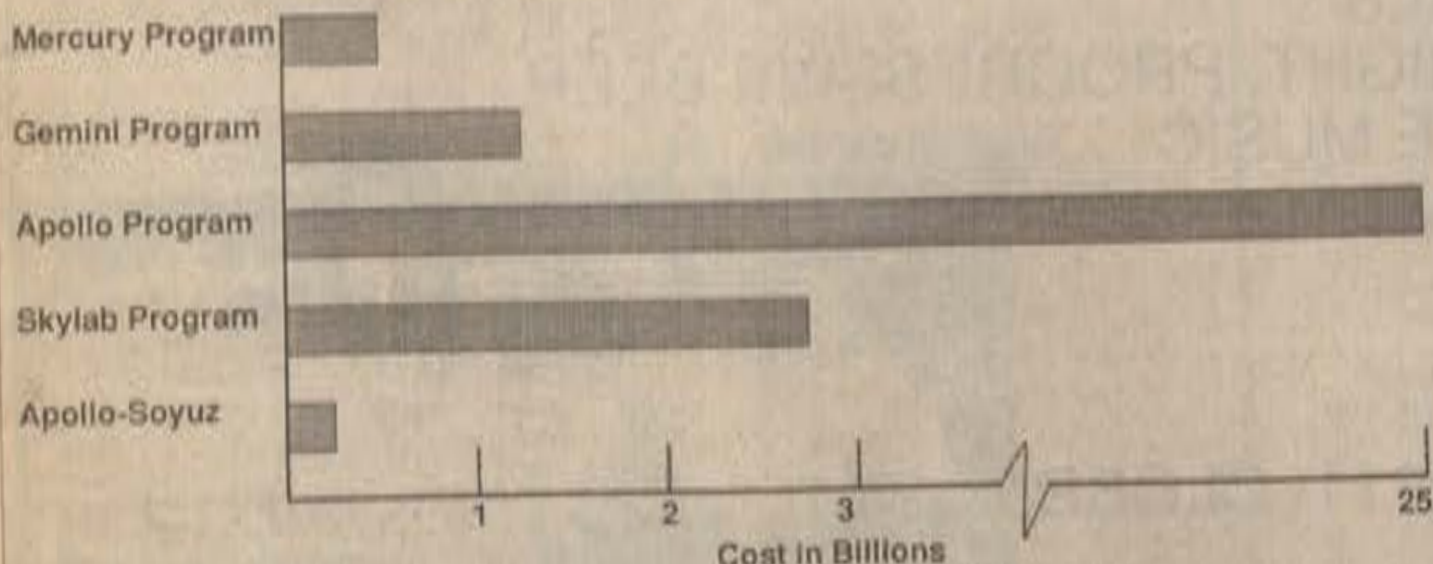
lander detaching and landing on the surface. The only difference would have been that one cosmonaut would travel to the surface of the Moon.

During the ascent phase from the lunar surface, the Soviet lander would leave the Moon and rendezvous with the second spacecraft still in orbit around the Moon. It contained the necessary supplies for the return to Earth.

The Soviet lander had three rocket engines and four extendable landing legs. The Apollo lunar module had one rocket and four fragile landing legs.

The lunar mission to the Moon was postponed in 1972 and mothballed altogether in 1974. This gave them the priority to start the space station development which led to their successful Mir station.

### Past Manned Space Flight Costs



Includes costs of rockets, rocket engines, spacecraft, tracking and data acquisition, operations, operations support, and facilities.

graphic by Derrick Seys / Source NASA

### Deep Space Network communicates data

by Joshua S. Mussat  
Space Technology Writer

The NASA Deep Space Network (DSN) is a worldwide system for navigating, tracking, and communicating with spacecraft exploring the solar system. The network is managed by the Jet Propulsion Laboratory (JPL) of the California Institute of Technology pioneered the development of many of the critical elements of communications systems designed to function over the vast distances involved in planetary missions.

The network of antennas is the like to distant spacecraft, transmitting instructions to them and receiving the

data they return to Earth from deep space. The DSN is a vital element in every space flight project. It is the communications link that ties the sophisticated instruments of the spacecraft to the scientific labs on Earth.

The history of the DSN dates back to the 1950's, when it evolved from tracking and data recovery techniques which developed in JPL's missile work for the U.S. Army. In 1958, the laboratory established a three-station network of receiving stations to

gather data from the first U.S. satellite, Explorer I.

The DSN uses large antennas, low-noise receivers and high-power transmitters at locations strategically located on three continents. The network has grown to include 12

deep-space antenna stations in a global network. The three deep space communications complexes are located at: Goldstone in Southern California's Mojave Desert; near Madrid, Spain; and near Canberra, Australia. The three loca-

tions are approximately 120 degrees apart in longitude so that as the Earth turns on its axis, a distant spacecraft is almost always in view of one of the stations. The network operations control center at JPL which controls and monitors operations at the three complexes.

Each complex is equipped with a 64-meter diameter antenna station, with improvements to provide a 70-meter antenna to improve in sensitivity. In addition each complex has a 26-meter antenna and two 34-meter antennas. One of the 34 meter antennas at each of the complexes is a new

see NETWORK, page B6



**Hello out there...**

The Magellan spacecraft is one of the crafts being covered by the DSN. One way light time is over 10 minutes.



**No good news...**

Learjet president Brian E. Barents announced last Thursday that Learjet would be dismissing 250 employees after news of losing the Air Force's contract competition.

## Learjet has announced TTTS personnel layoff

by Joseph A. Salerno  
Aeronautica Editor

Learjet Corporation announced Thursday, February 22, that it would layoff approximately 250 to 300 hundred people from its Wichita, Kansas base of employment after the Air Force announced its intentions to award the contract for the initial phase of the Tanker Transport Training System to Beech Aircraft Corporation and McDonnell Douglas. Employees being dismissed were hired during a personnel buildup by Learjet to anticipate the possibility of the company winning the TTTS contract competition. The layoff will take place this week.

"While we regret the necessity of the layoff," Brian E. Barents, chairman, president, and chief executive officer, said, "it was necessary that we

take some up front risk and begin aircraft certification and certain production build up to accommodate the demanding Air Force aircraft requirements and delivery schedule in the event we were awarded the contract. The increase in employment during the past several months was primarily for the TTTS program and due to yesterday's announcement, these employees will no longer be required."

**The increase in employment during the past several months was primarily for the TTTS program.**

**Brian E. Barents  
Learjet President**

The layoff will result in Learjet's Wichita employment being reduced to approximately 2,200 with total employment expected to remain at approximately 2,550.

## Belgian Air Force C-130s await wings

by Joseph A. Salerno  
Aeronautica Editor

Lockheed Aeronautical Systems Company-Georgia is now under contract to build new outer wings in kit form for twelve Belgian Air Force C-130 Hercules air transports.

The new wings will incorporate technology improvements developed by Lockheed since 1972. Among these improvements are new stress corrosion resistant material, externally mounted fuel probes, a new fastener system, better lightning protection, strengthened rib caps and braces, and superior tank sealing.

While there is no specific service life of a C130, according to John Waters, Regional Sales Manager for the Supplies Sales and Contracts Department for LASC-Georgia, installing the newer outer wings on earlier models will extend the life of the popular transport. A service life in excess of 30,000 flight hours or approximately 30 years is expected of the new outer wings, with replacement of the old outer wings with the new ones, reducing both operational and maintenance costs of the Belgian C-130s.

The outer wing kits will be built and packaged in Marietta by LASC-Georgia and then shipped to SABENA Technics, a Hercules service center. They will then be installed by SABENA Technics at their Brussels facility. Scheduled to begin

**New feathers...**

Belgian Air Force C-130s, like the one shown here, will soon receive new outer wings which will be structurally more sound and increase the expected life span of the transports by up to thirty years.

In May of this year, outer wing kit deliveries will continue at a rate of one per month through April 1991.

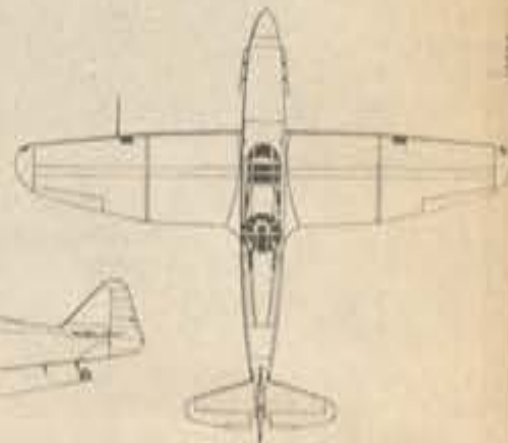
Belgian AF C-130s are attached to the 15th Transport Wing at Melsbroek, which began operating the transports in 1972. Its fleet has seen extensive duty over Europe and Africa over the past 18 years.

## Last week's winner named

Congratulations to James Lord who guessed last week's Aero Identification correctly by recognizing the Fiat G.55/1 Centauro. Nice job James.

The Fiat Centauro, which appeared late in World War Two, was a derivative of the G.50 Freccia, with the main structural difference being the shape of the cowl. Maximum speed of the G.55 was 385 mph, with a main armament of two 12.7 mm Breda-SAFAT machine guns above the front fuselage plus one 20 mm Mauser MG 151 cannon firing through the propeller hub. The G.55/1 also carried two 20 mm MG 151s in the outer wings. The G.55/1 single seat fighter saw service in Italy, Spain, and Finland.

## AERO IDENTIFICATION



Name.....

ID-entry.....

ERAU-box-#.....

Return this form to the Avion. The exact entry drawn, 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.

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## F15 Strike Eagle II asks for too much

by Joe Cambron  
Managing Editor

*F-15 Strike Eagle II (SEII)* is a new game from Microprose intended to follow up on the success of *F-19 Stealth Fighter*, while still building on the original *F-15* game. Although graphics have vastly improved, the game suffers from several serious flaws.

For reference, this review was conducted on an IBM Clone AT with VGA graphics, 1024K RAM, a 16 MHz Landmark rating, and a 30 Megabyte hard drive. One would think that the graphic speed offered by an 80286 and a VGA card with 512K would be overpowering. Not so, with this program.

With full graphic detail operative, the airplane was lethargic and nearly uncontrollable. Turns were inefficient and flight control chaotic.

With lesser graphic capabilities employed, the *F-15* one must pilot through a number of missions was much more controllable, but in the process most of the advantages associated with the improvements in *SEII* were lost.

For instance, the misty sky of slowly fading blues, and the razor sharp

nose-back view of the pilot in the cockpit with the horizon at his back were lost.

Though many may not agree, an 80386 should not yet be required to run any game, particularly after viewing the graphics and control afforded by *SEII*'s sister product *Stealth Fighter*. Another definite drawback involves simply using the game under its ungainly protection scheme.

A key disk must be inserted each time the game is played, the keydisk is one of the two 360K disks that come with the game. Oddly, these two disks may only be used temporarily to play the game because your pilot log and rank cannot be written to these disks. What all this means is that the program must be run from floppy, and the tiresome process of constantly changing disks must be employed. (Start up process: DOS, Flight Diskette, Key Disk A, Flight Diskette, Flight Diskette B, (play game), Flight Diskette, DOS.)

Those in the know are probably asking, "why not load the entire mess onto that thirty megabyte hard drive?" At least two excuses are acceptable.

First of which is that one must still deal with the key diskette. Second and

*The tiresome process of constantly changing disks must be employed...*

perhaps more importantly, *SEII* does not interact very well with any Terminate and Stay Resident (TSR) programs.

After starting up my computer in the usual fashion, a quick switch to drive A quickly produced horror. The disk would not function, it simply asked repeatedly for the "KEY DISKETTE" over and over again, unstoping until the entire computer had its plug pulled. Apparently a TSR that formats disks concurrently when called upon was the culprit.

Disheartened a floppy DOS boot seemed my only hope in averting a long wait for a costly backup disk (Software stores are notoriously unwilling to take back damaged disks). To my surprise it worked, proving the TSR guilty.

The actual game is not a bad one, but it is simply too expensive to take advantage of. No one has the money to invest \$2000 in a machine that plays games only a few times more complicated than a new Nintendo.

If you are the owner of an 80386 machine, however, and are looking for a taxing software package, then this is the perfect flight/combat simulation.

## Coast To Coast's disk copier not worth the time or money

by Jason Simon  
Data-Tech Editor

A relatively new addition to the world of computers is the copy board. Copy boards were designed for the computer user who has many copyrighted disks and is afraid of disk errors, trashing a program that may cost hundreds of dollars. These boards allow the user to make backups of his copyrighted software, which alleviates the problem of lost data. One of the makers of the copy board is Coast To Coast Technologies.

Coast To Coast Technologies concentrates on copy boards for the Amiga and Atari ST market. The advertisement was very convincing, promising to copy ANY disk in under fifty seconds. The hardware was supposed to contain a custom chip, that interfaced with the computer, so that the information from the copyrighted disk streamed out of the parallel port of the Amiga instead of the disk drive port. The disk drive was to be attached to the hardware, thereby creating the back up disk.

The back up was to be exactly like the original. All the features of the original disk were to be resident, including the infamous copy protection. In essence, an exact mirror copy would be created.

### Quick service?

On January 9, 1990 this board was purchased. The woman on the other end of the telephone line, who took the order, promised that the board would arrive in seven to ten days. After twenty-three nail-biting days passed, the small box finally arrived at its destination.

What was in the box was not what was expected. There was one small piece of hardware that looked like it couldn't copy a blank disk. It consisted of a parallel port interface and a hand soldered disk drive interface, connected by a small length of black wire. The hardware was very fragile and the connections to the computer had to be done with extreme care, avoiding the inevitable cracking sound of an interface being demolished.

After the hardware was attached, the software was put into the disk drive. The Amiga started to read the information and then came to a crashing halt. Upon examination of the software, it was discovered that Coast To Coast Technologies sent Atari software with an Amiga hardware interface.

After several calls to the company, the proper software arrived on March 2, nearly two months after the system was purchased it was ready to copy.

After reading through the single page of instructions it was discovered that Coast To Coast Technologies blatantly lied in their advertisement. The company promises in the ad that any disk would be backed up in under fifty seconds. In the instructions it states that due to advanced copyrighting procedures and non uniform disk drive speeds that the copier will not back up every piece of software, like the advertisement claims. This was evident

when a failed back up of ReadySoft's *Dragon's Lair* crashed the Amiga computer several times.

Instead of condemning the utility right away, another back up attempt was made. After reloading the system a perfect back up copy of Cinemaware's *The Three Stooges* was created. It was so perfect that the computer could not distinguish the back up from the original when they were exchanged during the same run of the program.

### Features

An added feature to the back up board is the expanded track selector. The user can select to copy any amount of data he wants, from one half a track all the way up to ninety tracks. This allows the user to copy programs that use more tracks than a normal seventy-nine track, 880 kilobyte, Amiga System disk. It is assumed that the Amiga user with an IBM bridgeboard can back up the eighty track, 720 kilobyte IBM disks in his collection.

### Hardware problems

Although this copy board is a nice addition to any Amiga users collection, Coast To Coast Technologies needs to work on some major problems in the hardware. The hardware is very fragile an utmost care must be used when attaching and removing the back up utility. The board renders the second disk drive inoperable when it is attached to the computer. The copier must be removed before being able to access the power of the second disk drive, which makes the wear and tear on the fragile components a significant factor. The disk drive interface does not have a protective cover on it. The circuitry on the board is exposed to dust and dirt, in addition to making the interface look very unprofessional.

**Customer relations**  
However the biggest problem this company has is with customer relations and prompt service. When a company promises in an ad that its copier will copy ANY disk, that is what is expected from the user; not a disclaimer in the instructions that tries to correct a lie that was printed in the advertisement.

In addition, the advertisement promises that the copier will be delivered in days and not weeks, so that the user can enjoy the use of his copier right away. After almost two months of waiting for hardware and software it was concluded that this claim was also false. If a company that is located in Altamonte Springs, Florida can't deliver a working version of their hardware to Daytona Beach in a reasonable amount of time then I'd hate to see how long it takes this company to deliver the same piece of hardware to Hawaii.

Even though this copier works on most software, the incompetence of Coast To Coast Technologies makes this copier not worth the wait. Before considering this company, look around for other companies who market a similar system, unless the user enjoys being kicked around by a company who appears insensitive to their customer's needs.

*After reading through the single page of instructions it was discovered that Coast To Coast Technologies blatantly lied in their advertisement.*

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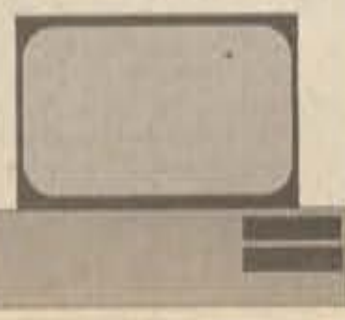
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2-4-1 10 til ?

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## by Gary Larson



### Cow philosophy.



Although it lasted only 2 million years, the Awkward Age was considered a hazardous time for most species.

*by Mike Peters*



## by Joe Martin





## 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 affect 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 ERAU student vehicles will be towed from the Health Center parking lot near the AWS. There will be no prior warning for this violation.

#### Income Tax Preparation

Volunteer Income Tax Assistance will be available every Tuesday from 5:00 p.m. to 8:00 p.m. in the Conference Room in Room A-117. This is run in conjunction with the Taxation Class taught by Ms. Wilson.

#### University Bookstore

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

#### Attention: Cheerleading Tryouts

Varsity cheerleading team signup starts March 12 (Monday). Tryouts are open to male and female

students who are interested in showing spirit and pride for their school. The deadline for signup is March 23 (Friday). A mini camp will be given March 31 (Saturday) from 9 a.m. to 1 p.m.. The following week practice will be held every night from 5 to 7 p.m.. Tryouts will be held on April 7 (Saturday) from 9 a.m. to 1 p.m.. Applications can be obtained at the off-campus Housing Office, Dorm II, room 274 from 8 a.m. to 5 p.m.. Any questions call 239-6560 ask for Trudi Peckham.

#### SGA elections coming soon

SGA elections for President, Vice President, Supreme Court Chief Justice, and members of the Student Representative Board and the Student Finance Board will be held Thursday, March 15 from 9 a.m. to 4 p.m.. These will be in the Student Center and in the AMT Complex.

There is a field of approximately 20 candidates running for the various offices within the SGA. Your support is greatly needed for the these students, if they are to be successful. So bring a friend and vote.

They are here to represent you and want to know your opinions, concerns and problems. Help them serve you better. Stop by the SGA Office in Room 140 of the Student Center.

Vote and voice your views. You do make a difference.

#### Management Club hosts FAA Administrator

The Management Club will entertain James B. Bussey, the FAA Administrator here at ERAU on April 10, 1990 from 10 a.m. to 2 p.m.. The point of contact for this endeavor is Tracie Anderson, box 7614.

#### Happy Birthday to Sigma Chi

The Sigma Chi Chapter birthday party will be March 16 to 18, 1990. The Chapter is celebrating 19 years on campus here at Embry-Riddle.

#### ODK will sponsor seminar on leadership

Omicron Delta Kappa will sponsor Capt. Kim Scribner to speak for a leadership seminar on March 20, 1990. See the ODK club presentation board in the S.C. for details.

#### IFC Softball Marathon comes to Riddle

The Inter-Fraternity Council will run a softball marathon on March 16 to benefit the Special Olympics. Contact Ricardo Castellon at 767-8140 for details.

## Network

(continued from page B1)

high-efficiency antenna that provides improved telemetry performance needed for outer planet missions.

Different sized antennas have different communications capabilities. The 64-meter antennas, the most sensitive, support deep space missions. The 26-meter antennas support selected spacecraft in Earth orbit, and the 34-meter antennas are used to support both types of exploratory missions.

The 34 and 64-meter stations are remotely operated from a centralized signal processing center that houses the electronic subsystems that point and control the antennas, receive and process the telemetry, generate and transmit commands, and produce the spacecraft navigation data. The 26-meter stations have not yet been equipped for unattended operation. In addition to the giant antennas, each of the stations is equipped with transmitting, receiving, data handling and inter-station communications equipment.

The complexes can be teamed for scientific investigation with such techniques as Very long baseline in-

terferometry (VLBI), in which measurements made by two or more widely spaced antennas can be combined to obtain the resolving power of one giant antenna theoretically spanning the distance between them. Relatively new applications of the technique -- such as mobile VLBI antennas for geodetic measurements and delta VLBI for measuring very slight changes in the Earth's crust -- promise further advances.

Communications with spacecraft in deep space will always be DSN's primary focus, but the network also has assumed responsibility for all Earth-orbiting satellites that are not compatible with NASA's Tracking and Data Relay Satellites (TDRS). In addition, the DSN will provide launch and transfer orbit support to a variety of spacecraft bound for geosynchronous orbit, and emergency support for the tracking satellites themselves and for other spacecraft that would normally communicate through TDRS.

The network also is a scientific instrument and has been used for many radio science experiments: probing natural

radio sources -- pulsars and quasars; planetary radar studies of planet surfaces and Saturn's rings; celestial mechanics experiments, some involving testing the theories of relativity; lunar gravity experiments; and Earth physics experiments. One of the most dramatic of the non-flight experiments for the DSN is the search for extraterrestrial intelligence.

The DSN Ground Communications Facility controls the circuits that link the three DSN complexes to the network operations control center at JPL, and to the flight project center in the United States and overseas. Simultaneously with the routing to the control center of the spacecraft telemetry, distance and speed information are generated by the DSN and transmitted to the control center for spacecraft navigation.

Commands are sent from the control center to one of the DSN stations where they are loaded in a command processing computer, automatically verified for accuracy, and transmitted to the proper spacecraft.

The DSN has provided tracking and data acquisition

support to the Ranger, Surveyor and Lunar Orbiter Moon exploration projects. The Mariner series of missions to Mars, Venus and Mercury, the Pioneer Venus and Jupiter and Saturn flights. Also, the joint U.S.-West Germany Helios sun-orbiting probes, the second of which reached the end of its 10-year mission in early 1986. Finally supplementary support to the manned space flight network for the Apollo lunar landing program.

The network currently supports the sun-orbiting Pioneers 6 through 9, Pioneers 10 and 11 which are beyond the orbit of Pluto, and 12, which is in orbit around Venus; Voyager 1; Voyager 2; Nimbus 7, a weather satellite used for oceanography and pollution monitoring; Magellan, on a journey to map the planet Venus; and Galileo, on a trajectory to study Jupiter.

As the United States, and countries throughout the world continue to explore the unknowns of our solar system and universe, the Deep Space Network will continue to provide the necessary link between Earth and the vastness of outer space for years to come.

#### Students with Epilepsy

Meet others with epilepsy. Share ideas and strategies. Learn about new developments. Wanting to start an educational/support group, please contact Agnes De Polo at tel. no. 258-9968 or Box 1035, or Barbara Blair at Health Services.

#### Students with Diabetes

Meet others with diabetes. Share ideas and strategies. Learn about new developments. Wanting to start an educational/support group, please contact Agnes De Polo at tel. no. 258-9968 or Box 1035, or Barbara Blair at Health Services.

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## → Autos for sale

1983 Jeep CJ-7-33 in. tires, 258 6-cyl engine, 5 speed, 4 by 4, half top, rag top, tilt, PS, PB, asking \$4,000 obo. Call 274-4848.

1988 Chevy S-10 Truck-AC, \$1000 down and take over \$170 per month payments. Call 672-4777.

1985 Buick Electra 225-4 dr., white, V8-401, 4 spd. \$900. Call Stefan at 254-2980 (afternoons).

1973 Lincoln Continental-2 dr., black, V8-460, 4 spd. \$600. Call Stefan at 254-2980 (afternoons).

1983 Mazda 626-luxell. condition, all power, incl. elect. gauges, new transmission. Runs very good. Call Mike at 760-6618.

1980 VW Scirocco-Dependable, runs great, front spoiler, sun roof, fog lights, some rust, incl. AM/FM. \$1200 obo. Call 239-9437.

## → Roommates

Roommate Needed-Neat, non-smoker. To share great 3 bdrm on the beach. Close to school, fully furnished, \$150 mo. \$100 deposit. Call Jim at 252-5907.

Apt. for Rent-2 bdrm. Clean, across from beach and 15 min. drive from school. Located in good area. Call Flor de Maria after 3 p.m. at 252-0270.

TOWNHOME FOR RENT-2 bedroom, 2 bath, brand new, Deerwood (behind the Mall), \$525. Call Nancy Sheldon 760-6000.

Wanted, Need to find apartment for Fall 90 and after. Want to get lease and deposit done before leaving for Summer break. Looking for rent in 200-300 range. Darren Box 3565.

Female Roommate wanted to share new (2 bdrm, 2 bath) lakefront apt. at the Groves. Rent is \$250 per month; 1/2 off 1st month rent. Must be neat and non-smoker. 1 yr. or 7.

## → Cycles for sale

1986 Honda Elite 250 Scooter-Bought new in spring of 1987, 60 mph, 30 mpg, only 3K miles, black and gold, cover and helmet included. Well maintained, new condition. Must sell, graduating. \$1750 obo. Call Scot at 274-4161 or box 2731.

1981 Kawasaki CSR 750-Good cond. Very dependable. Asking \$650. Call 252-5388 or (407) 323-9797.

## → Misc. for sale

\* \$979 IBM AT Clone w/10 Meg Drive \* Unopened, super-fast (15.3 times PC speed), with hard drive. Including computing's new standard the Intel 80286. Up to 4 Megs of RAM. OS/2 Capable. 0 Wait State. 1.2 Meg Floppy. Monitor and software. CALL 238-7355

\* \$599 100% IBM Compatible Computer \* This unopened, unbelievable low priced computer at 2.1 times PC speed. 640K, Drive, 101 Keyboard, and monitor. Add \$175 for hard drive. CALL 238-7355

For Sale-Jeep light bar with 4 landing lights. \$60 obo. Call 274-4848, leave message.

For Sale-IBM PC Convertible. \$600 obo. Call 672-4777.

For Sale-New Nomex Military Ft. Suit. \$140 value for only \$80. Call 672-4777.

For Sale-NBC Shotgun Shell Reloader and supplies. Call 672-4777.

For Sale-Combat Harness, all G.I. issue. Web belt, canteen with cover, field dressing pouch, and 30-rd. magazine pouch. All good condition. \$35 obo. Contact Yousef at box 8908.

For Sale-Chinese SKS Battle Rifle. Brand new, only fired 40 rounds. 7.62 X 39 mm, semi-auto, folding bayonet, sling. Retails at \$400, asking only \$200. Contact Joe at 8908.

For Sale-Mini-14 Assault Rifle. Mini. semi, 5.56 mm NATO, semi-auto, 3 magazines, sling, cleaning kit incl. A steal at \$450. Must Sell. Contact Joe at box 8908 if interested.

For Sale-Surfboard, 6 ft. Rusty, rounded-pin-tail, thruster, good condition. \$125 obo. Call 252-9051, leave message.

For Sale-Cobra 40 channel base station with 80 usage sideband and Silver Eagle Mike. Will sell or Trade for \$200 obo. Call Greg at 257-1239 or box 8265.

For Sale-10 piece sectional couch in very good condition. Good Price. Call 239-0960.

For Sale-Waterbed. Queen size, 60 by 84. Book case, head board with mirror, 3 sets of sheets. New condition, will deliver. \$225 obo.

House for Sale-Willow Run, 3 bdrm., 2 bath, family room with fireplace, dining room, living room, fenced yard with Jasmine. St. Augustine Lawn with sprinkler system, landscaped with azaleas, hibiscus and crepe myrtle. FHA assumable. \$79,500. Call 788-3351 or ext. 6809.

## 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.

For Sale-Henry Backstage Plus. 35 Watt, distortion, reverb, bright and thickest effects. Separate Flanger Pedal. Both in great condition. \$150 for both. Call Glenn before 9 p.m. at 258-7579.

For Sale-Set of Boston Acoustics 6X9's; never installed \$150 obo. JVC portable CD player, very nice \$150 obo. Set of Pioneer Acoustic suspension 30 RMS speakers, \$100 obo. Contact Chris at Box 7237 or 756-8374.

For Sale-Over stuffed love seat with handmade slip cover, \$50. 12 speed Perma bike, only one year old, \$100. Contact Matt at 255-3057 or Box 6767.

For Sale-IBM PC/XT, Dual disk drive, 5 1/4 in. floppy, enhanced keyboard and IBM Proprietary. Muck software including Word Perfect, Lotus, Primavera, etc. Also includes oak work station. All for \$1600. Call Paula at 239-6241, 8 to 5 weekdays.

For Sale-Color Monitor and adapter for an IBM PC convertible. \$249 obo. Call 760-4685, leave message.

For Sale-IBM PC convertible, Make an offer. Box G-225.

For Sale-Hye catching bike. 10 speed huffy, with lock and chain (girls bike). Brand new, only used a few times. Excellent cond. \$100 obo. For further info, call Lorena at 257-5611.

For Sale-Yamaha PSR-90 electronic keyboard. Five full size octaves with many sounds and rhythms. MIDI capability. \$400 obo. Call Brian at 255-8481.

ARCHERS Would you like to become President? Help reactivate the Archery Club/Team. See Prof. Wm. Brown, Glass Office No. 7 or call ext. 6722 or 761-9384.

Escape to Romance-Romance novels for sale. Harlequin Romance and Temptation, modern, contemporary love stories (1986 to 1990 novels). Just 50 cents a book. Call Lorena at 257-5611 or come see me for more info. at Donna R. Box 264.

Professional Typing Service-Resumes, Technical Reports, Term Papers. \$1.25 double spaced page. Call 767-0778 after 6 p.m. or ext. 6229 during the day.

Wanted-100 feet of flight, 2 gallons of prop wash, 1 VW bug radiator, 10 metric crescent wrenches. Inquiries contact box 8353.

Airline ticket for sale: Daytona to Syracuse, NY. Leave Mar. 29. Return Apr. 3. \$75 or best offer. Contact John at 254-4865 or Box 5013.

For Sale-Panasonic Cordless phone; \$100. Uniden Cordless phone, \$50. Panasonic electronic typewriter, \$100. Double bed, \$30. 2 lamps \$10 ea. 2 alarm clocks, \$5 ea. 16 in. oscillating stand fan, \$15. Small heater fan, \$10. Electric drill (bricks and boards), \$10 ea. Woodshelf for tapes, \$15. Call Stefan at 254-2980 (afternoons).

For Sale-IBM Portable PC runs at XT speed, two 3 1/2 in. drives, modem, carry case, printer, software. \$999 obo. Call Shane at 255-4767.

For Sale-4 Mustang Alloy Rims. \$600 value will sacrifice at \$50. Call 274-4010 anytime or 3 to 9 p.m., Call Shane at 258-3511.

## → Miscellaneous

Wanted-used Plexifol 10 or 12 ft. Call 258-5974, leave message.

Wanted-Person able to give piano lessons, 1 to 2 hours per week. Willing to pay. Contact Ray at box 6396, leave phone number.

Wanted-Designer to develop electronic schematic for invention. Call Greg or Ray at 257-1239 or box 8265.

Professional Typing Service-Reports, Resumes, Letters. Call 6229 or 767-0778 after 6 p.m. or weekends. \$1.25 per double spaced page.

JUST TO DO IT: Like to try creating NEW music? Contact amateur lyricist and creative person; create band - down to earth musicians - no drugs. For fun, silent night, experience. JON at 788-8902 OR box 5998.

Need a paper typed? I can do it for you. Typed, spelling and grammar corrected for \$1 per page. Contact Matt at 255-3057.

Reward: Lost: One black nylon cloth single fold log book case containing medical, private pilot license, and log book. If found please contact Box C111, or 253-8016.

## → Personals

AMW Oh how I trust thee, I just can't wait and see. Because I know we will sail and you will satisfy this mail. DTSM

I can't be social if I can't stand up. UN-COOL.

MR. BUNGLER Let's go feed the ducks.

CHIP Any good fat jokes lately, or should I say fat stories? DREW

TO THE QUEEN OF THE MOON Can I tickle your toes? (Your head will have to be attached). THE BARON

TO THE WRIGHT AVIONICS GIRL. The second effort is always better than the first. Thanks for effort # 2. THE ONE WHO MOVED OUT

IVILLYN, Hope you feel better soon. JENNY

CHRIS Happy Birthday! EVERYONE

DON You're the best Ambulance Service in it state. THANKS NANCY

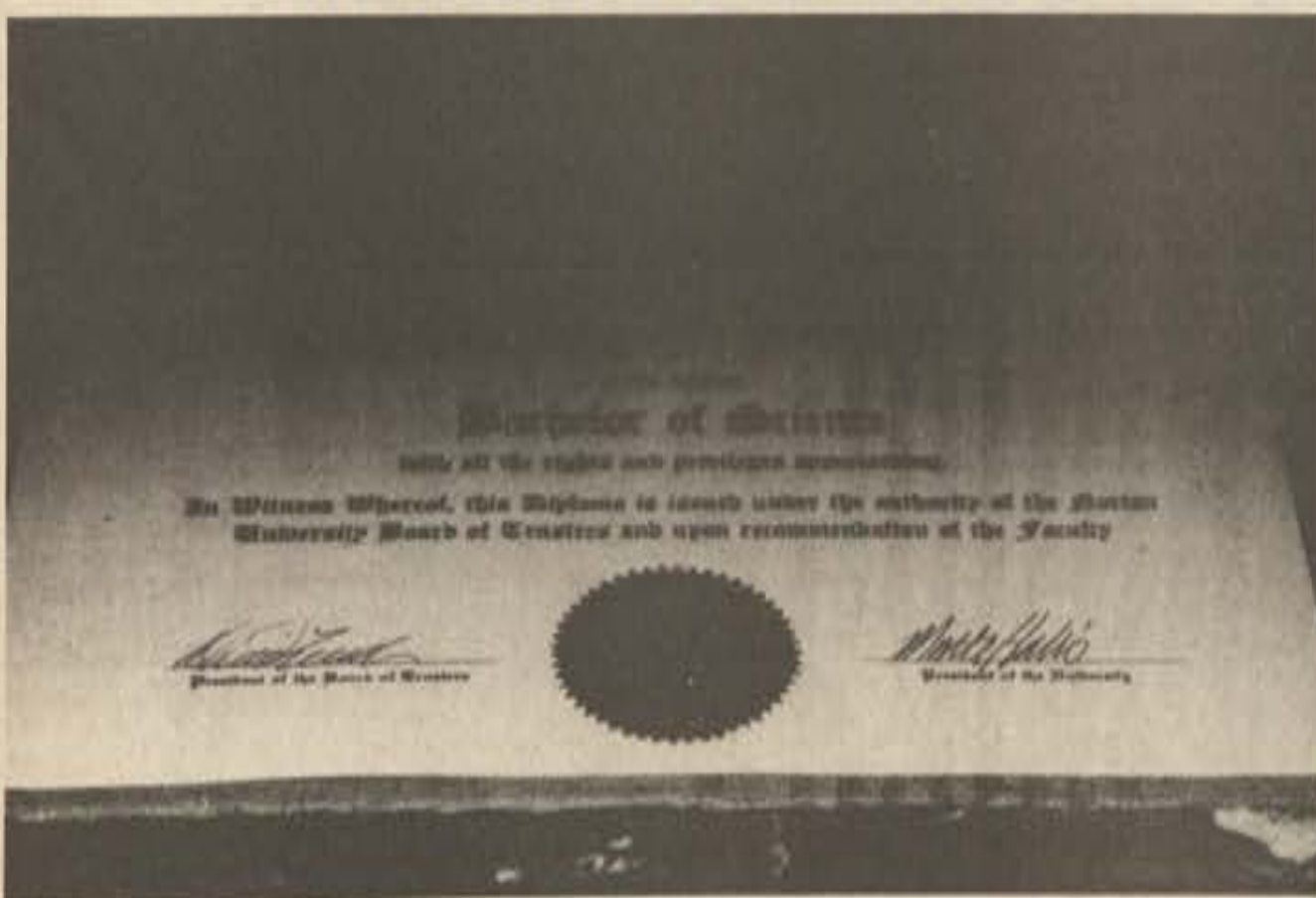
TO R. Trust is not only a word, it has a meaning as well and it maybe the key to a personal future. L.L.

OLAF I think you'd make a great doctor. Thanks. LOVE YA NANCY

POUGE, Do you remember when you were young and proud about life. Some where down the road you lost that spontaneity about life. Where did it go? What will it take to get it back in the way it used to be. On second thought you are fine the way you are. TIF Q

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