

11-28-1990

## Avion 1990-11-28 (B)

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# Space Technology

B

Volume 67, Issue 11

The Avion, November 28 1990

## Columbia to perform experiments on orbiter systems

by Joshua S. Mussat  
Space Technology Writer

When the space shuttle *Columbia* travels into space next month, it will be carrying aboard an extensive array of astronomy equipment, making this the first spacelab mission devoted to a single scientific discipline, astrophysics. Also aboard the *Columbia* will be a set of six experiments designed to evaluate flight performance during the launch, boost, orbit, entry and landing phases of a mission.

The advent of operations of the shuttle orbiter provides an opportunity for researchers to perform flight experiments on a full scale, lifting vehicle during atmospheric entry. In 1976, to take advantage of this opportunity, NASA's office of Aeronautics, Exploration and Technology instituted the orbiter experiments (OEX) program.

Since the program's inception, 13 experiments have been developed for flight included among the six experi-

ments on this flight, five were developed by the Langley Research Center, which were intended to operate together as a complementary set of entry research instrumentation. This flight marks the first time since the September 1988 return-to-flight that the Langley experiments will fly as a complementary set. The sixth experiment on this flight was developed by the Johnson Space Center.

### SEADS

The Shuttle Entry Air Data System (SEADS) measures the distribution of air pressure around the orbiter's nosecap during entry. The pressure data are processed after the mission to provide precise determination of the orbiter's attitude relative to the oncoming airstream and the density of the atmosphere through which it has flown.

Accurate knowledge of these "air data" parameters, coupled with vehicle motion data (measured by a separate instrument), enables accurate determination of the aerodynamic characteristics of the orbiter in the actual flight environment.

The SEADS experiment is a unique nosecone, placed on the orbiter *Columbia*, which contains an array of 14 penetration assemblies. Each penetration assembly contains a small hole through which local surface air pressure is sensed during ascent and entry. Internal "plumbing" connects the pressure orifices to 28 pressure sensors mounted outside the nosecone cavity on the nosecone aft bulkhead. Each orifice is connected to two pressure sensors, one of which is sensitive to high-level pressures (0 to 20 psia) and one of which is sensitive to low-level pressures (0 to 1 psia).

All components of the penetration assemblies and nosecone internal tubing are made of coated metal, called columbium. They are subjected to temperatures in excess of 2,500 degrees Fahrenheit during entry.

The SEADS experiment, which has flown on three previous flights of *Columbia*, is turned on just before *Columbia*'s deorbit engines fire to initiate orbiter entry into Earth's atmosphere. Experiment data are recorded on an OEX tape recorder aboard the vehicle. The system provides accurate measurement of air data from an altitude of about 300,000 feet through landing.

### SUMS

The Shuttle Upper Atmosphere Mass Spectrometer (SUMS) experiment complements the SEADS experiment by gathering atmospheric density information at altitudes above 300,000 feet. SUMS samples the gas at *Columbia*'s surface through a small hole located just aft of the nosecone and forward of the nose wheel door. The SUMS instrument utilizes a mass spectrometer operating

as a pressure sensing device to infer atmospheric density in the high-altitude, rarefied flow regime where the pressure is too low for the use of ordinary pressure sensors. Data analysis after the mission will enable determination of atmospheric density.

Like SEADS, SUMS provides atmospheric environmental (density) data which are used in conjunction with vehicle motion information to determine orbiter aerodynamic characteristics. SUMS operates at altitudes where the atmosphere is rarefied (extremely thin). Aerodynamic flight at these altitudes cannot be simulated in ground facilities.

### ACIP

The Aerodynamic Coefficient Identification Package (ACIP) instrumentation includes triaxial sets of linear accelerometers, angular accelerometers and rate gyros, which sense the orbiter's motions during flight. ACIP provides the vehicle motion data which is used in conjunction with the SEADS environmental information for determination of aerodynamic characteristics below about 300,000 feet altitude.

### HIRAP

The High Resolution Accelerometer Package (HIRAP) is a triaxial, orthogonal set of highly sensitive accelerometers which sense vehicle motion during the high altitude portion (above 300,000 feet) of entry. Accelerations in all three axes are measured to about one part per million in terms of local gravity. This instrument provides the companion vehicle motion data to be used with the SUMS results.

### SILTS

The Shuttle Infrared Leaside Temperature Sensing (SILTS) experiment obtains high-spatial-resolution infrared images of the upper (leaside) surfaces of the orbiter's port wing and fuselage during entry through the atmosphere. The infrared images provide detailed "maps" of the surface temperatures of leaside thermal protection materials. The temperature information indicates the amount of aerodynamic heating experienced by the leaside surface in flight. This environment cannot be adequately simulated in ground facilities.

The SILTS experiment is initiated by an orbiter computer command when *Columbia* reaches the entry interface altitude (about 400,000 feet).

The camera obtains an image approximately every 8.6 seconds. More than 150 infrared images are obtained during 22 minutes of experiment operation. Experiment data are recorded on the OEX tape recorder for processing and analysis after the mission. On two previous mis-



### Taking a peek...

The vertical tail of *Columbia* contains a special pod that is used to take infrared pictures of the orbiter during re-entry.

During the STS-35 mission, the experiment has been reconfigured to obtain images of the upper fuselage.

### AIP

The AeroThermal Instrumentation Package (AIP) comprises some 125 measurements of aerodynamic surface temperature and pressure at discrete locations on the upper surface of the orbiter's left wing, fuselage and vertical tail. These sensors were originally part of the Development Flight Instrumentation System which flew aboard *Columbia* during its Orbital Flight Test missions (STS-1 through STS-5). They have been reactivated through the use of an AIP unique data handling system. Among other applications, the AIP data provide "ground-truth" information for the SILTS experiment.

### Future benefits

Measuring the performance of the Space Shuttle orbiter is crucial for evolutionary development of advanced space transportation systems, such as heavy-lift launch vehicles and orbital transfer vehicles. These vehicles could deploy and service large, automated, human-operated multi-functional satellite platforms and an inhabited permanent facility, such as Space Station *Freedom*.



### Nose job...

The nose cone of *Columbia* contains 14 penetrations assemblies. These assemblies are used in the SEADS experiment to measure the surrounding air pressure during the re-entry phase.

## Space news...

**Secret mission lands at homebase...** Space shuttle *Atlantis* and its five men crew landed safely at the Kennedy Space Center (KSC) last week spending four days, 21 hours, 54 minutes and 28 seconds in space. After a spectacular night lift off, the shuttle made a perfect landing at the KSC on November 20.

*Atlantis* was originally supposed to land at the Edward's landing facilities in California, but due to high winds, rain and snow it had to be diverted to Florida. This was *Atlantis*' first KSC landing, and the sixth time for a space shuttle. The last one was *Discovery*'s mission 51-D in April 19, 1985. *Discovery* has landed three times at the KSC, *Columbia* has never landed at the KSC and *Challenger* landed twice.

Space shuttles rarely land at the KSC because of the damage that can be caused to the landing gear by the hard runway there. On previous landings, shuttle tiles and tires have been damaged. Another reason is the short length of the runway, only 15,000 feet. Even though this is the world's largest runway, it is not as long as the landing facilities at Edward's. In case of any unforeseen eventualities that the shuttle need more landing space, it might not have as much space to spare. This is one of the reasons why a drag chute is being tested for installation on the space shuttles. In fact, the new space shuttle *Endeavor* will be the first shuttle to have the drag chute.

Post flight operations continue on *Atlantis*. So far everything checks o.k. Normal tile repair is underway and the cargo bay doors were opened.

**Atlantis crew sends message to desert troops...** Commander Covey of mission STS-38 had the opportunity to break the complete communication silence during the mission's secret voyage to send a message to the American troops in the Gulf. The message read:

"This is from The Orbiter *Atlantis*. I'd like it to go through the United States Central Command to the men and women of Desert Shield. During the last few days, we aboard *Atlantis* have circled the Earth many times. Whenever we pass close to Saudi Arabia, we cannot help but think of our soldiers, sailors, airmen and Marines deployed there for Desert Shield. As the holiday season approaches, the multiservice crew of *Atlantis* wishes those brave warriors peace and a speedy return home. Our prayers are for them and their families and this is from the crew of *Atlantis*."

**Full scale shuttle to be on display at KSC...** A full scale model of a space shuttle, the *Ambassador*, will be on display at the Kennedy Space Center (KSC) during Christmas season. The *Ambassador* was named for the fact that this replica is destined for extensive international showing.

The *Ambassador* is a steel and fiberglass replica measuring 56 feet high, 122 feet long and 70 feet in wing-span. It was originally constructed for showing at the Expo '92 World's Fair in Seville, Spain, but the owners first wanted to premiere *Ambassador* to the Spaceport USA public.

The replica will be open to visitors during normal Spaceport USA operation hours beginning mid-December until April, with an option to extend the viewing through mid-September, 1991.

**Hubble Telescope zooms in on Saturn's Great "burp"...** A tremendous white spot discovered on Saturn by an astronomer captured such attention that the Hubble Telescope was configured to take more pictures of Saturn. Scientists do not know what caused this phenomena but are still investigating. The spot is actually a huge gaseous storm. This is not the first time that a white spot of such magnitude has been discovered on Saturn. Other spots have been observed as far back as Galileo's time. It is presumed that such spots occur with the change of seasons on Saturn, which are not as often as those of Earth.

## Tomorrow's technology created today: the X-30

by Brian Marchessault  
Space Technology Writer

NASA and the Department of Defense (DOD) have teamed up with five major contractors to create the spacecraft of tomorrow, the National Aerospace Plane (NASP). This dream of the future, also dubbed the X-30, is to be a vehicle which can take off like an airplane, fly on its own power into space and the return to Earth to land on a standard air strip. What looks like something out of the movie *2001: A Space Odyssey*, the NASP represents the technology of tomorrow being created today.

### The fabulous five

Rockwell International, McDonnell Douglas, Pratt and Whitney, General Dynamics and Rocketdyne make up the contract team on the project. This is a unique first step by NASA and DOD in creating a single team of contractors from which to pool information. The move was made in order to benefit from the collective efforts of the five organizations, as opposed to having several companies competing for the contract. Thus, the contractors and the government both will be enabled to make great gains in the five bases of technological advances.

### The past, present, and future

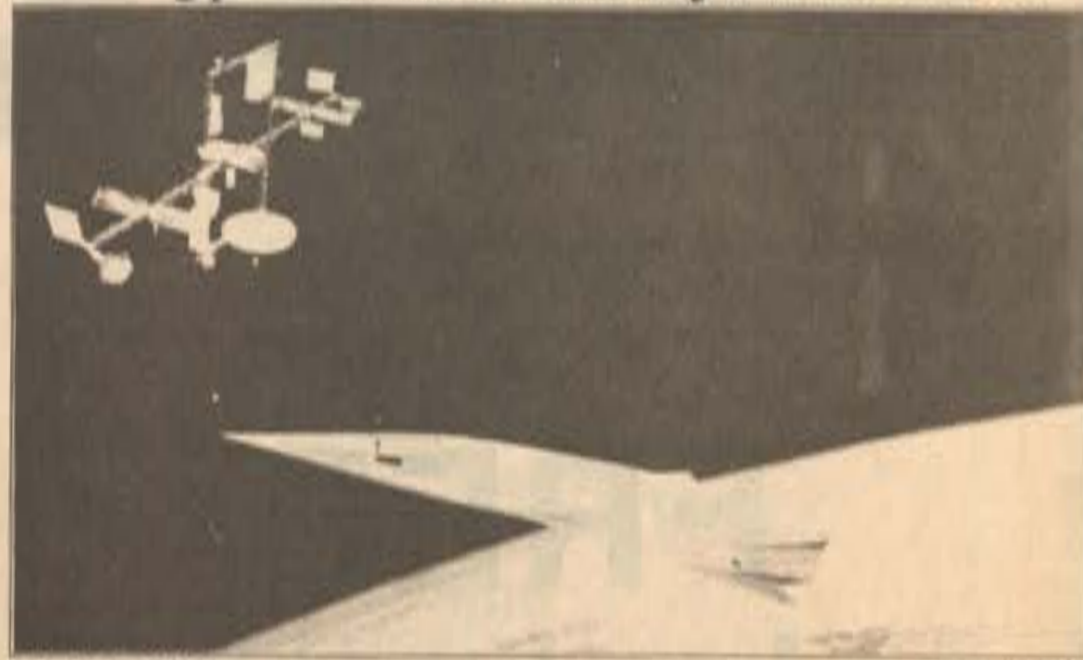
The NASP Joint Program Office (JPO), established in 1986, executes the program management in contracted efforts and NASP technology developments. The JPO is involved in the decision expected in 1993 to proceed on construction upon completion of the development phase of the project.

Next, they will select a team of contractors to construct the flight demonstration aircraft, the X-30. One or more of these may be fabricated and modified during this phase of the program. Flight tests may then begin in 1996 and 1997, running for two years.

The President approved the continuation of the program along with an implementation plan in 1989. The plan extended technology developments until 1993 to reduce technical and costs risks. The Fiscal Year 1990 budget for the NASP was set at \$254 million. Approximately \$20 million was planned to actually be used in 1990. These funds were to upgrade several of the existing test facilities in order to prepare them for engine testing in FY 1991 and 1992.

### The challenge

After taking off from an air strip, hypersonic flight in excess of 4,000 mph (above Mach 5) will be attained by the X-30. Before entering space, the vehicle must still be air-breathing. Yet, after the



### Airplane 2001...

The NASP airplane is a sleek designed vehicle capable of taking off like any ordinary aircraft, accelerate into orbit like a rocket and return for a smooth landing on the other side of the world in just hours.

transition through the atmosphere, it must be powered without the use of air. The actual size of the vehicle is currently designed to be about the size of the space shuttle orbiter or a Boeing 727. Because of these extraordinary air/spacecraft characteristics of the NASP, many innovations in current technology must be made.

Due to the varied fuel demands of the NASP, a high energy "slush" hydrogen propellant is currently being focused upon by researchers.

Possessing the same propulsive capability of liquid hydrogen, the denser slush requires smaller, lighter fuel tanks. This reduces the size of the NASP and its liftoff weight by up to 30 percent. It is also a better coolant for the vehicle and engines. Various research areas are being explored by The National Institute of Standards and Technology, McDonnell Douglas, the University of Michigan and Colorado and the Los Alamos National Laboratory.

Wind tunnels are in use along with 50 percent of the country's supercomputers in solving the aerodynamic problems created by the X-30. At hypersonic speeds, the airflow moves at about two miles per second around the aircraft. Also, en-

gineers are not able to separate airframe and engine analysis at these speeds. Airflow around areas where fuel and air are mixed and ignited creates a challenge at speeds such as 12,000 per per second as well. Thus, computational fluid dynamics computer codes are being developed. Computers must be used since there are no wind tunnels which can test the airflow around complete models at speeds above Mach 8.

Various materials are under consideration for the skin of the NASP, as it must be lightweight and withstand cycling through extremely hot and cold temperatures. Carbon-carbon is one of those being considered in order to reduce the oxidation experienced at high temperatures. Titanium-aluminides are also under scrutiny due to the increase in temperature capability for the X-30 and since it allows for a thinner, lighter structure.

### The dream will continue

Great breakthroughs have already been made and are presently being made in bringing the NASP closer to becoming a reality. Scientists and engineers coupled with government, industry and university researchers make up a team of 5,000 people dedicated to this task. These advances are leading to a new generation of high speed, lightweight aircraft, as well as paving a more flexible and accessible road to space. The NASP is truly a marvel of the 21st century, bringing men one step closer to a real space odyssey.

**Before entering space,  
the vehicle must still be  
air-breathing. Yet,  
after the transition  
through the atmosphere, it  
must be powered without  
the use of air...**

## Sound blasts into your home computer

by Joe Cambron  
Managing Editor

For years, the Adlib sound card has become the ad hoc standard in improved IBM PC sound. Its FM synthesis technique provides multi-voice sound for composing and adds a distinctive pleasure to games that support its use. Now PC sound has taken a further step towards where it should be.

Creative Labs is now providing a truly competitive alternative to the Adlib Music System. This product is called the Sound Blaster and its only drawback is a slight price disadvantage. One might think that buying a Sound Blaster would leave its owners longing for product support in the form of games meant to use its functions. Creative Labs overcame this problem immediately by making the product fully compatible with the Adlib.

With the playing field now even, the Sound Blaster tips the board by adding digitized sampling capability, voice input via microphone, text-to-speech capability, a joystick port, and a MIDI interface (used to

communicate with professional music equipment).

For years, the only simple PC sampling has been a penchant of Tandy computers. Their simple mike jack and free software may have paved the way for computer music. This system suffered from its exclusivity to a single computer line, now any IBM PC/XT/AT can have this capability with the Sound Blaster.

**The Sound Blaster tips the board by adding digitized sampling capability, voice input via microphone and text-to-speech capability.**

The VOXKIT software included with the game has the capability of sampling any sound when used with a microphone (not included). The sounds may be played, stored in memory, saved to a file, or compressed and stored (samples take an inordinate amount of memory).

Say can read text files to the user while away from the computer. This is, by the way, an excellent opportunity to check for errors in one's writing.

FM Intelligent Organ uses the Adlib's music synthesis technique to allow the user to compose simple music with rhythms and

background accompaniment added to provide depth to the music. These compositions may be stored or played. A number of pre-created songs also are provided with the package.

Two other ingenious programs that come bundled with the Sound Blaster are *Talking Parrot* and *Dr. Sbaitsio*. *Talking Parrot* uses a mike and attempts to cajole and mock the user in much the same way a real parrot would. An animated parrot even appears on the screen.

Dr. Sbaitsio is a psychiatrist which responds in a melodic voice to your typed inputs. For instance, a query of "I feel depressed" might elicit this response, "There is no reason to feel depressed, tell me all your troubles." This program is entertaining if only in the ways it understands what you ask it.

All of these things that the product is capable of cost only about \$30 over the cost of an Adlib Music System (\$120), if purchased by mail.

With, in essence, a greater number of supported software packages than the Adlib can ever have, Sound Blaster appropriately describes what it does to the competition.

## Upgrading your own computer is cheaper

by Roland Houle  
Data Technology Editor

Most PC owners or buyers all dread one thing about their computers - the fact that one day their computer, that they spend thousands of dollars on, will become outdated. This can be avoided by upgrading your computer.

If you bought your computer several years ago, it is most likely a 286 based machine. However, with the ever increasing pace of technology, the newer models are 386 and 486 based systems.

This may cause some dismay because you may feel your model is obsolete.

Computers are becoming easier and easier to upgrade to newer models. Now, aside from some minor adjustments, you only have to change the mother board in most popular computers. This can be done in just minutes.

In most cases, a mother board can be removed and a new one put in with a screwdriver as your main tool. Most bookstores will carry books on how to build your own PC. One of these books can be used as a reference for changing your board.

A drawback from upgrading is that your system may not run as fast as a genuine system with the same mother board.

Some of the more popular models that can be easily upgraded are the AST Premium, Compaq Deskpro 33L, IBM PS/2 Model 70, and the Everex 286. Many other systems manual and ask upgraded. Read your owners manual and ask company representatives about your particular system.

**By just buying a mother board to change, which may cost several hundred dollars, you may save many more hundreds from not having to purchase an entirely new system. Also, you save the time you would spend in trying to sell your old system.**

By just buying a mother board to change, which may cost several hundred dollars, you may save many more hundreds from not having to purchase an entirely new system. Also, you save the time you would spend in trying to sell your old system.

Before upgrading, I would suggest that you really think about whether it is necessary or not. You may only have a 286 or even an XT based system, but if all you use your computer for is games or word processing, it may not really be worth the money.

### Dictionary of Computer Terms

MIDI-A Musical Instrument Digital Interface is a standard way of communicating musical information between different electronic devices such as synthesizers and computers.

Data base - a collection of data stored on a computer storage medium, such as a disk, that can be used for many different purposes.

PC - Personal Computers are computers designed to be used by only one person.

286 - 286 computers use Intel 286 chips as their central processing unit (CPU). Similarly, a 386 and 486 use Intel 386 and 486 chips respectively as their CPU's.

Mother board - the main circuit board in a computer that has the central processing unit on it.

Synthesizer - an electronic device used to duplicate musical sounds.

CPU - the Central Processing Unit is the part of a computer where arithmetic and logical operations are performed and instructions are decoded and executed.

## Symantec's Q&A is a versatile database program for users

by Roland Houle  
Data Technology Editor

For people who are looking into getting a database program for their home computer, Symantec's Q&A program may be just what you need.

This database program is simply to use and is quite versatile. Although the database feature is only one of several aspects of the program, it is by far the most useful.

For new users, a database program is a program used to keep a collection of related records in files. It is similar to keeping an organized filing cabinet of information.

A unique feature to Q&A is that it has an intelligent report maker. You can use plain English to ask for a report, and the program will generate it to the best of its abilities.

For a database of this school for example, you may ask, "I need a report of all the female aeronautical engineering students with a GPA above 3.5." If Q&A does not recognize any of the words, it will request additional information,

otherwise, it will generate your report. This feature gives Q&A its name, which stands for Questions and Answers.

Many reports can be generated from the same database, and databases can be easily modified to meet changing demands.

Other aspects include a mailing label maker and even a word processor. The mailing label maker can be very handy, but the word processor cannot compete with dedicated word processors such as *Microsoft Word*, *Word Perfect*, or *WordStar*.

The word processing aspect can be very useful in sending personalized letters, though. The database and the word processing program can be used together to personalize names, addresses or other information in letters or reports.

Q&A can import databases from the *dBase* family of database programs. Also, Q&A files can be saved as ASCII files to be used in *dBase* programs.

Whether you have used a database program before or not you are an expert, Symantec Corporation's Q&A can fulfill your needs.

**Whether you have used a database program before or not, Symantec Corporation's Q&A can fulfill your needs.**



**File it away...**  
This database program has the capability of generating reports from requests entered by the user in plain English. The program, called Q&A, is a product of Symantec Corporation.

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**Air Wisconsin and United Airlines sign five-year marketing agreement**



**Positioning...**

Air Wisconsin and United Airlines have signed a new United Express contract. William J. Andres and John C. Pope, Air Wisconsin president and chief executive officer, and United executive vice president respectively, jointly announce their new five year agreement superseding the existent contract.

by **Todd Hughes**  
Opinions Editor

Air Wisconsin and United Airlines have signed a new United Express contract. William J. Andres and John C. Pope, Air Wisconsin president and chief executive officer, and United executive vice president respectively, jointly announced their new five year agreement superseding the existent contract.

In announcing the agreement, both Andres and Pope amplified that the terms of the new agreement will continue a beneficial business arrangement. Andres said, "After being in the program for over four years, both Air Wisconsin and United have learned from the experience," Andres went on to add "We have maintained those elements of the program that are working well and have modified other aspects of the program."

Pope reinforced and added to what Andres had to say. Pope is quoted as saying "The new five year United Ex-

press agreement between United and Air Wisconsin represents a commitment to a long-term relationship that has proven to be mutually beneficial to both companies and, most importantly, to our customers.

The United and Air Wisconsin marketing arrangement permits United Express customers to share in the benefits of competitive joint fares, coordinated schedules, convenient connections and superior service." The agreement gives Air Wisconsin the means to compete in the world market.

Air Wisconsin was the first regional carrier to enter into an agree-

**Air Wisconsin was the first regional carrier to enter into an agreement with United Airlines to provide United Express Service.**

ment with United Airlines to provide United Express Service. Both carriers exchange passenger and cargo traffic at the major connecting hub airports of Chicago O'Hare International and Washington Dulles International Airport and also at Denver with Air Wisconsin's subsidiary, Aspen Airways.

Both airlines are profiting from this agreement. Air Wisconsin will get an increase in passengers because of the increased number of flights offered through United.

United will benefit from the passengers. It will now take United to get to an Air Wisconsin flight.

Travelers will also benefit because Air Wisconsin will now participate in United frequent flyer program. It will also give passengers who live in small towns and fly United the option to fly, rather than be driven to the bigger airports.

Everyone stands to benefit this agreement.

**Rotorway introduces kit-helo**

by **Brett Messimer**  
Aeronautica Writer

Rotorway International, a new company founded from the old Rotorway, Inc., introduced a new, redesigned version of the old Rotorway EXEC kit-built helicopter.

The helicopter has been thoroughly redone, and some 19 head, instead of being on the floor. Radio buttons and the starter were moved to the cyclic handle for better access. Better seats for comfort have been installed along with eyebrow windows above the windshield. Other changes have been made to improve performance, structure and control.

The new helicopter, called the EXEC 90, was unveiled at the 1990 Oshkosh EAA Fly-In, and the kits have been in production since summer.

The kit for the helicopter contains everything needed to fly except the paint. Rotorway International manufactures the powerplant, does the machining and assembles the tougher assemblies.



**Rotorway...**

Rotorway International introduces a new kit helicopter.

Rotorway International also produced a new manual with illustrations and easy to follow instructions for each step of the assembly.

Rotorway International is planning to activate a flight instruction program in 1991 to instruct EXEC 90 builders on the essentials of helicopter flying.

The EXEC 90 is being offered for under \$40,000 and includes all items necessary to fly, the EXEC 90 weighs 925 pounds and can be transported on a snowmobile trailer.

It has a range of 180 miles on seventeen gallons of fuel, and a service ceiling of 10,000 ft.

The new president of Rotorway International, John Netherwood,

recently expressed the positive attitude felt by his company for the new release. "We went through the entire structure of the helicopter," said Netherwood, "and redesigned or repositioned 19 features. Some of the changes will be fairly conspicuous to previous EXEC builders," said Netherwood.

"To guide the builder through the process, we've developed a new 'seedo' manual, every step of the process is illustrated with photographs and concise explanations.

It's safe to say, there's never been a quicker, easier, less technical way for anyone to build their own helicopter."

**Passenger traffic up 4.1 percent**

WASHINGTON, D.C. Airline passenger traffic increased 4.1 percent in October, compared with the same month last year, and was up 5.9 percent for the first ten months of 1990, the Air Transport Association reported earlier this month. In domestic service, traffic increased 1.5 percent in October.

Available seat miles were up 5.4 percent. The passenger load factor averaged 59.0 percent, down from

61.2 percent for October, 1989. Passenger enplanements decreased 0.1 percent to 33.5 million. In international service, traffic in October rose 12.1 percent. Available seat miles increased 13.2 percent. The load factor was 64.6 percent, compared with 55.2 percent for October 1989. 3.3 million passengers were enplaned in October, up 9.3 percent from the same period last year. For the first ten months of 1990, domestic traffic increased 2.6

percent, and available seat miles were up 6.0 percent. The load factor decreased to 60.9 percent. Passenger enplanements increased 1.8 percent, with 335.8 million passengers.

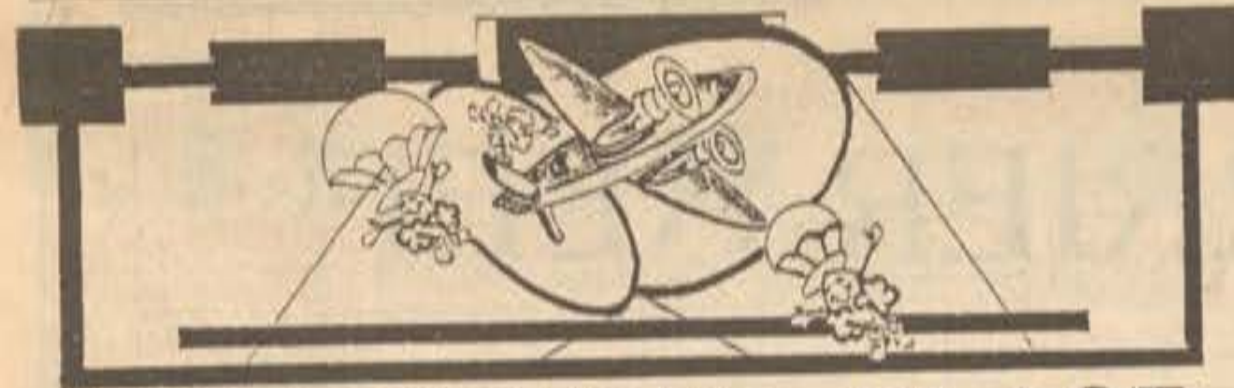
International traffic for the first ten months of 1990 was up 16.1 percent. The available seat miles increased 11.1 percent, and the load factor averaged 70.3 percent. The number of passengers increased 12.9 percent to 35.0 million.

**Aero identification**



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\$.50 Taco's  
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### Saturday: Progressive Night

### Thursday: Starving Students Night!

\$1.00 Well And Call Drinks All Night  
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Sunday: Comedy Night  
9-12 pm. Comedy Show  
10-12 Slave Party  
All Bar & Restaurant Employees Drink Free And Get In Free

### Friday: Ladies Night

9-11 pm. Nasty Boy Male Review  
Free Drinks, Free Admission  
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Friday: Free Drinks 9-11  
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Calvin and Hobbes

by Bill Waterson

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THE REAL FUN OF LIVING WISELY IS THAT YOU GET TO BE SMUG ABOUT IT.

I HATE THINKING THIS STUFF! IT'S TOO MUCH WORK! WHY SHOULD I BOTHER?

UNTIL YOU STALK AND OVERRUN, YOU CAN'T DEFOUR ANYONE

I CAN SEE WHY TIGER APHORISMS DON'T CATCH ON.

LIVE FOR THE MOMENT IS MY MOTTO

YOU NEVER KNOW HOW LONG YOU'VE GOT! YOU COULD STEP INTO THE ROAD TOMORROW AND WHAM - YOU GET HIT BY A CEMENT TRUCK! THEN YOU'D BE SORRY YOU PUT OFF YOUR PLEASURES!

THAT'S WHY I SAY "LIVE FOR THE MOMENT." WHAT'S YOUR MOTTO?

"LOOK DOWN THE ROAD"

I'VE DECIDED I DON'T WANT TO BE FAMOUS.

NO?

NAH. ANY IDIOT CAN BE FAMOUS. I FIGURE I'M MORE THE LEGENDARY TYPE!

VH HUH.

WELL I DIDN'T MEAN RIGHT THIS SECOND!

Far Side

by Gary Larson

Hold on there son. You best find some other berries to eat. And put that sweater on - before you catch a cold!

Luckily, Eddie had stumbled upon a rare variety of deadly nightshade, the amicable *Atropa belladonna congenialocus*. (Later that same day, however, he blundered into some poison oak — a flat-out intolerant species.)

And so it went, night after night, year after year. In fact, the Hansens had been in a living hell ever since that fateful day the neighbor's "For Sale" sign had come down and a family of howler monkeys had moved in.

"Gee whiz ... You mean I get a THIRD wish, too?"

CAN WE BURN THESE LEAVES?

NO, THAT POLLUTES

BUT HOW CAN WE APPRECIATE THE MIGHTY SNOW DEMONS IF WE DON'T SACRIFICE ANY LEAVES? WE'LL HAVE A WARM WINTER!

I DON'T KNOW WHETHER YOUR GRASP OF THEOLOGY OR METEOROLOGY IS THE MORE APPALLING

I GUESS I'LL GO LIGHT SOME CANDLES AROUND THE TOMBOWAN AND BEG FOR MERCY

DO YOU THINK TIGERS GO TO THE SAME HEAVEN THAT PEOPLE GO TO?

I MEAN, IN HEAVEN, EVERYONE IS SUPPOSED TO BE HAPPY RIGHT? BUT PEOPLE WOULDN'T BE HAPPY IF THEY WERE ALWAYS IN DANGER OF BEING EATEN BY TIGERS!

ON THE OTHER HAND HEAVEN WOULDN'T BE VERY NICE WITHOUT TIGERS. EITHER, I WOULDN'T BE HAPPY IF THERE WEREN'T ANY TIGERS TO MISS THEM.

MAYBE TIGERS JUST DON'T EAT PEOPLE IN HEAVEN

BUT THEN WE WOULDN'T BE HAPPY

"Hold still, Omar. ... Now look up. Yep. You've got something in your eye, all right — could be sand."

"That story again? ... Well, one stormy night, when the whole family was asleep, your grandfather quietly rose from his bed, took an ax, and made aaaaaaall you little grandkids."

Mister Boffo

by Joe Martin

ANOTHER WAY TO TELL WHEN YOU'RE DEALING WITH THE DOTTING PARENT

DO YOU SEE WHAT YOUR KIDS DOING TO OUR WALL?

POP POP POP

WE'RE POOR BECAUSE WE THINK WE'RE POOR!

IF WE THOUGHT WE WERE RICH WE'D BE CRAZY!

LEMONADE 5¢

THERE'S THAT SCRATCHING NOISE AGAIN.

Mother Goose and Grimm

by Mike Peters

GESUNDHEIT.

ARE YOU SURE THIS IS DOG FOOD?

I WONDER WHAT SHE MADE FOR ME TONIGHT.

WHEEZE

POP.

LIVER.

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\* Shoppes at Beville, Next to Mega Movie • 1500 Beville Road, Daytona Beach \*

**MORRISON'S FOOD SERVICE**  
**ANY COMMENTS OR QUESTIONS?**

Next Friday, Nov. 30 there will be a questionnaire available in the Student Center for anyone with comments in the food service here at Embry-Riddle. we need your input to better serve your needs. The Food Services Committee, a part of the SGA working for you.


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**Holiday committee to decorate Student Center**

On Thursday, November 28 at 3 p.m., the Student Activities Department will be holding a meeting regarding those students interested in helping to decorate the Student Center and support a holiday program for all the student body. The meeting will be conducted in the front lobby of the Student Activities office.

If you have signed up or would just like to attend, you are welcome to participate. This is your school, your Center and your time to make this holiday special.

Time lines include: getting decorations and the tree on December 5, and holding a program, giving out candy and food, decorating the tree and Center on December 6, the day before classes end.

If you know of others who may want to join this special committee, feel free to bring them or let them know of the times and dates.

Happy Holidays, and best of luck in all your final tests and projects.



**Bookstore announces buyback policies**

Need Money? Get up to 50 percent of the new price and Instant Cash for your used books.

Here are some things to consider when selling back used books: If your book has been reordered for the next term, the bookstore will pay you 50 percent of the new list price, until the bookstore has bought the number needed for the next term's use. After that, wholesale prices will be offered for those books. The earlier an order is received from the department, the sooner the bookstore can pay 50 percent for it.

If your book has not been reordered for the next term, without an official order for your book, the bookstore has to sell and ship it to used book wholesalers, who offer lower prices (10-33 percent), based on used book buying guides.

If you have an old edition and publishers issue a newer edition, the old edition (in most instances) has no retail value and the bookstore can not buy it.

When books are sold back they must be in good condition. We cannot buy back books with bindings broken, pages missing or printing blacked out.

Used books kept for sale in the store for the the next term will be priced at 75 percent of the new list price. Therefore, you will save a fellow student 25 percent off the new price the next time that book is sold in the bookstore.

**Choral Society looks for members**

The Daytona Beach Choral Society is currently expanding its membership. Any student, staff or faculty member is cordially invited to join this most prestigious group of local singers. The Choral Society rehearses on Tuesday evenings at 7:15 p.m. at the Seabreeze United Church. The Society gives approximately ten to twelve concerts a year mostly in local churches. It covers the Messiah to Broadway show music and light classics. Although previous musical experience is desired, it is not essential. Rehearsals are in themselves a learning experience and many of their most talented singers have begun their singing career with the Society. Please give thought to joining a group that will give you years of enjoyment.

You may call the following number for additional information, or for an application blank: Ray Charette 441-2613.

**Spring degree applications available**

Applicants are being accepted for those expecting April '91 degree completion. Come to the Registration and Records Office and fill out an application to receive a "Preliminary Evaluation".

If a prospective employer requests a transcript for a job interview, we must have a written request from you before information can be released. Stop by the Registration and Records Office and see us about request forms. After you leave, no request can be done without a written request and a \$2.00 fee, if an Official Transcript is needed.

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**WEDNESDAY, NOV. 28**  
4:00 pm  
**Elections for Editor-in-Chief will be held**



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<p><b>Education Package C:</b> <b>AMIGA A2000HD SYSTEM</b> A2000HD CPU, 1 Mb Memory, Mouse 40 Mb Hard Drive AmigaVision Authoring System A1084 RGB Color Monitor List Price: \$3,098 <b>PRICE: \$1,599</b></p>	<p><b>Education Package D:</b> <b>AMIGA A2500/30 SYSTEM</b> A2500/30 CPU (25MHz), 68882 math co-processor, 5 Mb Memory, Mouse, 40 Mb Hard Drive AmigaVision Authoring System A1084 RGB Color Monitor List Price: \$5,798 <b>PRICE: \$2,999</b></p>
<p><b>Education Package E:</b> <b>AMIGA 3000/25-50 SYSTEM</b> 68030 CPU (25MHz), 68882 math co-processor, 2 Mb RAM, 3.5 floppy, 50 Mb HD, mouse, multiscan RGB analog monitor and AmigaVision interactive authoring system List Price: \$4,798 <b>PRICE: \$3,039</b></p>	<p><b>PC Compatibility</b> Available upon request  A2088D PC/XT Bridgeboard List: \$699 <b>PRICE: \$459</b>  A2286D PC/AT Bridgeboard List: \$1,599 <b>PRICE: \$1,039</b></p>

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1974 CORVETTE STINGRAY CONVERTIBLE, 350, auto, air, red/white top, looks and runs excellent, great investment, must sell(graduating). \$9800 or trade, call 788-6540.

1977 BUICK REGAL, a/c, power windows and seats, runs very well, has new alternator, very cheap \$985.00. Call Ahmed after 4 p.m. 274-2271.

1979 OLDS CUTLASS SUPREME, 2500, 2-door, automatic, V8, new low profile tires and mag's, tinted windows. Must see to appreciate. A total at \$1000. or best offer. Contact Tom at 258-3714.

1989 TOYOTA SUPRA TURBO, fully equipped, cd/tape, etc., 24,000 miles, \$19500. Contact Ext 86404.

1980 HONDA CIVIC, needs engine work, \$501, call Pat at 760-6592.

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1988 HURRICANE 600, like new, call Joe at 767-2909.

1989 NINJA 600, Mint condition, less than 1000 miles, matching Shoei helmet, rear seat cowling, aluminum "Slip-On" pipes and exhaust. \$3500. Call Dave at 756-1869.

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1979 KAWASAKI KZ 1000 MARK II, Dual spark, big carbs, Cam gears degraded, gears in trans. back out, low miles, very clean. Must Sell \$1500 also. Leave message in box # 6031.

MOTORCYCLE GEAR. Small chest protector, small motorcycle pants, 6 3/4 Bell Motocross helmet, make offer. Contact Sally at ACET Dept. X6741 or 761-8600.

### → Misc. for sale

SKATEBOARD 11" Santa Cruz Deck, Gull Wing trucks, Bones wheels \$75. Contact Sally at ACET Dept X6741 or 761-8600.

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FEMALE PLANE TICKET, one-way to Phila., leave Dec. 20, asking \$75., call Mike 254-6988 or Box 6193.

AIRLINE TICKET, One way on Delta from Daytona to Washington National. Departs on Dec. 20 (evening flight). Asking \$150. OBO. Call Connie at 253-5499 or call Sandy at 239-6595.

AIRLINE TICKET, one round trip ticket on Delta for \$100 to Hartford CT., Use for Christmas. Call Jimmy at 255-6598 for details.

NEW COUCH AND CORNER CHAIR, teak end tables, new air conditioner, new extension BTS toron R-Ball Racquet, Panasonic 6" portable TV... Everything is in excellent condition. Call 274-5016.

TELEVISION SET, Like new, barely used. Asking \$175, negotiable. Call 258-6091 and ask for Mark.

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### → Personals

Crispy when the hell were you!!!!!!!

SALIVA MA, How was your quiet weekend at home? TV can be a great friend. CHICKEN LEGS

TO MY PAL DANNY, I want to say thank you for being there when I needed a shoulder. We've shared some great times and some great talks. I'll always be there for you friend. LOVE, BOOK BUNNY P.S. We don't sweat the small stuff.

TO BECKY, The coolest girl from Michigan. Have fun this Christmas. FROM FLINSTONE

TO THE LITTLE RED-HAIRED GIRL IN TECH REPORT Good performance. Happy belated birthday! Keep up the good work. IIC

TO AT Hope you enjoyed the Presidents address and the meal. I had a good time too! Stay around for next semester. I need you. HO

TO MW Hope you had a nice Thanksgiving. Thanks for the teddybear. Guess Who

TO THOMAS FAGLEY, You made ERAU lead the game!! Thank you. You are cute... PEANUTS

MR JOE DEBILLY Resistance is useless! Nothing can stop us now! THE BORG/ENERGIZER RABBIT ALLIANCE

TO CLIFF & DONNELLY, You are Mokondo. You have a dirty mind forever and ever. J

TO THOMAS FAGLEY, You are the best player in the Eagles team. You are one... ME

Good luck Air Assault. J.M.D.

TO SIGMA PHI DELTA, Thank you for everything. You are the best fraternity on campus. I'm sure you are. FLINSTONE

CLUBHOUSE, Only three more weeks!! Congrats again to Keony and Dia. Happy Thanksgiving!! M.F. M.I.L.P.

RESIDENTS OF ROOM 140, DORM II, I am selling communist revolutions. Would you by any chance be interested? DEANE

BINO, I had so much fun, I think I'll transfer to Daytona Beach! PRESCOTT EDITOR

JEFF, I hope we didn't keep you up to late! BOB

TO DARBUCK, The nicest guy in Sigma Phi Delta. FLINSTONE

MASTER STEVE FISCUS ESQUIRE ETC., I did not do it you knob! Congratulations on Ten Little Indians!!! ROSEHEAD

BOB, If you go to New York no jokes. BINO

DEAR RASHI, How did you like Veno? Want to go again? Anytime! LOVE MF

In fond memory of Andrea "Anna" Louise Carter, 1973-November 7, 1990.

TO DARRICK, To my favorite tweety from the fraternity. BUNNY BUNNY'S BEST FRIEND

NEW ENGLANDER Glad you had a good time up North. Only 2 more weeks left. I'll be thinking of you on the white beaches out West. WORLD TRAVELER

SOPH Thanks for the weekend. YOUR MENTAL GUTTERBUDDY

ERIN You'd look good in a me-so-horny. Think about getting one. SOPH'S GUTTERBUDDY

### 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.
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ROOMMATE WANTED: To share 3 bedroom, 2 bath, furnished house near school. Private room available. Room itself not furnished. \$185.00 per month + 1/4 utilities. Call 767-5917. Ask for Jeff, box 4217.

IIC Thanks for inviting me. I really had a great time. Hope we can do it again sometime. FOX

ROOMMATE WANTED: 2 bedroom 1 bath apt. 2 miles from ERAU. \$205.00/mo + 1/2 electric and 1/2 phone. Bedroom furnished if needed. Available after Dec. 12th. Clean apt. Contact Jay 252-2300.

TO THE PIG Landing time approximately four weeks. FROM THE GULF

ROOM WANTED: Room or 1/2 room needed until Dec. 13th. Quiet AMT student will pay \$140.00 (negotiable) up front. Need to leave rough neighborhood. Joe Box 9088.

BAAAAABY, How about that black leather mini and fish net at the O.P. MMMM. Sounds degood. C.L.

ROOMMATE WANTED: Spring semester, Sun Point Apartments 1 1/2 miles from school. \$255.00/mo., all utilities included, completely furnished, very nice place. Call Pam at 238-7154. Leave message if not home.

TO DENNIS ADAMS, You're ding!!! Are you jealous because of Molley? GARFIELD & PEANUTS

APARTMENT FOR RENT: One bedroom, \$365 per month at the Water Club. 3 miles from school. Take over 3 month lease beginning in January. Call Mark 238-8867 or put note in box 4025.

PEACH, Just thought I'd tell you again how much I love you and appreciate you. Happy Anniversary a week late. LOVE TIGER

STUDIO APARTMENT (ONE PERSON UNFURNISHED): Beachside location. 419 1/2 N. Olander Ave. 1 1/2 block south of Seabreeze Blvd. \$175.00 per month.

DANNY Season huh, sure smells great on you. GUESS WHO

TO THE WIMP WHO KISS CARS If you still have a problem with me, come find me. Don't take it out on a helpless car. FROM THE PIZZA STORE PUNCHER



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