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AERONAUTICA

McDonnell Douglas Apache ready to kill Iraqi tanks

by Tami Strout
Aeronautica Writer

Highly publicized problems with AH-64 Apache multi-role helicopter "have been largely resolved and are behind us," a top McDonnell Douglas executive announced today.

The AH-64 Apache helicopter is proving to be the most operationally ready Army aircraft in the Persian Gulf according to Representatives John Kasich (R-Ohio) and Jon Kyl (R-Arizona), both members of the House Armed Services Committee, following their return from a week long fact finding mission to the Persian Gulf.

In a report to the House of Representatives, Kyl said, "The people we talked with made no effort to hide the problems that the Apache has had in the past. The Apache is a very complex and technologically advanced aircraft which requires close attention just like any other complex piece of machinery. By the same token, the men who may have to fly the Apache in combat were equally strong in their statements that the Apache is the best attack helicopter in the world."

Recent press reports that the Apache helicopters in the Persian Gulf are operating below U.S. Army readiness standards are "blatantly untrue," McDonnell Douglas Helicopter Co. (MDHC) President Tom Gunn said.

"Apaches in the Middle East are operating at rates significantly better than the 75 percent mission capable rate required by the Army. MDHC is concerned that totally erroneous and unsubstantiated reports about low availability are being circulated."

In a response to CBS Network television "60 Minutes" aired on November 18, 1990, MDHC explains the "accurate" information of the problems and their solutions.

Some of the problems included availability, loss of gun control, a 30mm gun feed and rumors of rotor blades falling off in Panama.

Mr. Rick Stanley (former 1st Sgt., 2-229 Apache BN, Ft. Rucker) commented that maybe 10 of his 18 aircraft were available on any given day. MDHC response to this was that the 2-229 division used 18 Apaches in a field exercise titled Warlord Dragon that used extensive ammunition and flight time. The result of the operation averaged 96 percent fully mission capable. The 2-229 division was then shipped to Saudi Arabia.

The 30mm gun feed system and loader has been proclaimed as being an eight year old problem. MDHC said that since that report (information on the claim was based on 1987 scored data) the M230 has undergone continuous improvement. Today, MDHC claims the M230 will consistently pass a 100,000 shot test which the Army approved.

Mr. Jay Butler (former Apache pilot who was recently released from active duty) commented that 30 millimeter gun vibrations caused circuit breaker popping and loss of gun control allowing the gun to shoot in a direction not intended by the pilot. MDHC claimed this only happened once. Since then, a change was made in the electrical system to preclude recurrence and the problem was resolved in the field within 60 days. To prevent further problems with circuit breakers popping due to vibrations a change was made to the gun circuit breaker mount which eliminated the field problem.

One other report from Mr. Schaffer of the General Accounting Office (GAO) reported that main rotor blades were coming off in Panama and the units utilized green tape for the continuation of the mission. MDHC states that



McDonnell Douglas photo

Fort Apache...

The Apache is ready for combat after having corrected early problems. MDHC and the Army are confident it will be successful in the war to free Kuwait.

the blades never came off. They said the green tape was issued to cover bullet holes in the blades until they could be repaired.

They went on to say this ingenuity was practiced routinely in Vietnam. Media reports of using hair dryers and ovens have promoted the perception of system vulnerability to rain and humidity. In Panama, there were no missions aborted due to rain or humidity.

MDHC also responded to a report from GAO. MDHC claimed that the GAO report was based on information that was at least 18-24 months old.

That information does not reflect current readiness status. In the response MDHC went on to discuss each con-

cern of GAO and their solutions similar to that of the CBS response.

Not only is the Apache in better than good condition but it has just been decided by the Pentagon to be improved upon. The Pentagon has approved full scale development of a 3.5 billion radar missile weapon system, called Longbow, that will prolong production of MDHC Apache.

The Longbow Apache modifications are designed to enhance the Apache helicopter's fighting capability. Some of the features are a modernized cockpit, additional cooling, additional electric power, expanded forward avionics bays, and improved targeting/weapons systems.

Spirit of St. Louis flies again

By John McDermott
Aeronautica Editor

The EAA Aviation Foundation's replica of Charles Lindbergh's famous airplane, the "Spirit of St. Louis" completed initial test flights recently in Oshkosh, Wisconsin. This is the second such airplane constructed by the Foundation's staff and volunteers.

The Foundation's first replica has been retired from active flight status to the EAA museum after logging more than 1,300 hours. It is now the centerpiece of an exhibit which chronicles Lindbergh's famous flight. Interest in the airplane and Lindbergh's flight has continued, which is why the EAA decided to build a second replica.

Construction of the second replica began in the spring of 1990. Major support for the project came from the David Claude Ryan Foundation. The airplane will sustain the memory of design-

er T. Claude Ryan, the founder of the Ryan Aircraft Company, builders of the original "Spirit of St. Louis." The David Claude Ryan Foundation was initiated by T. Claude Ryan before his death and is funded by various family members. It is named in honor of Mr. Ryan's son, David, who lost his life at the age of 22 in a Korean War era training accident while flying an F-86.

Initial test flights on the second replica were conducted by EAA founder Paul Poberezny.

An official dedication flight is scheduled for early May. Several members of the Ryan family are expected to witness the flight. The airplane will remain on flying status at the EAA museum, and will fly to several aviation events this summer.



EAA photo

Back again...

E.A.A.'s second replica of the Spirit of St. Louis is ready to tour the country.

Spring 1991 Florida airshows

March 8-10, TICO Warbird Show, Valiant Air Command, 50th Anniversary of Pearl Harbor, Titusville, FL.
April 6-7, N.A.S. Cecil Field Open House, Blue Angels, Jacksonville, FL.
April 7-13, E.A.A. Sun 'n Fun Fly-In, Lakeland, FL.
April 20-21, Daytona Beach Airshow, Thunderbirds (Sunday only).

Boeing factory cleans up its act

by Todd Hughes
A.P. News Editor

With a commitment to be "a world class supplier of Boeing products," Fabrication Division Vice President and General Manager Bill Selby believes there must also be a corresponding world class environmental protection program.

Selby said "At Boeing our employees are the source of our success and we believe we have a major responsibility to them and to the communities in which they live and work."

Continually reducing the environmental impact of our operations is just one of our major commitments to the community. As a result the Fabrication Division has taken an initiative to improve its manufacturing process with the application of new technology and new practices aimed at enriching the environment.

The procedure for painting air conditioning ducts used to be wasteful: for every gallon of paint sprayed, only about one quart ended up on the part. The division implemented a new electrostatic spray process that has lowered paint consumption, reduced

emission levels and made for a safer employee environment.

With the new system, 65 percent or more of the paint ends up on the part. The process has become so successful that it is becoming a standard in many areas of the division.

Toxic chemicals leaking from underground tanks are constant reminders of problems that can arise from old technology and practices.

Rich Chasen, Boeing environmental engineer, said, "Each tank is a potential source of groundwater contamination. That's why you might see your neighborhood gas station digging up older tanks and replacing them with new ones."

During the last five years, the Auburn site has eliminated 24 of 30 underground tanks. The remaining six have been exchanged with new double-walled tanks equipped with leak-detection systems.

The removal and replacement of underground tanks has cost approximately one million dollars and has reduced the underground storage of chemicals and fuel from 179,100 gallons to 31,700 gallons.

Boeing has also made many improvements in the treatment of waste water in the past few years, according to Boeing Environmental Engineer Jeff Kellett.

Kellett said, "One of the major projects involving our Waste water treatment Plant is separating alkaline rinse waters from other rinse waters generated on site."

This alkaline rinse water (which is like the water left after washing your hands with soap) can now be safely released directly into the sewer system without treatment. The process is necessary because the flow of waste water to the treatment plant is expected to double in the next two years.

Instead of increasing the capacity of the treatment plant, Boeing is reducing the amount of waste water before it gets there. Not having to treat this water, reserves the division's waste treatment capacity and increases efficiency. "We're able to do a better job treating waste waters that can't be directly released," Kellett said.

The ability to remove chromium and oil from the waste water has also

been improved.

The Boeing Company has long been committed to recycling. A 1988 study of 844,000 pounds of Boeing's solid waste revealed that the company program captures 43 percent of its potentially recyclable content. At the Fabrications Division, paper, aluminum and other products find new life after they leave Boeing. In the past six months, the Auburn site has recycled 408 tons of paper and 194 tons of cardboard.

The aluminum can recycling effort has two objectives. The first of course is to recycle and the second is to generate income for Washington Special Olympics.

Shirley Wilder, recycling conservation coordinator for The Boeing Company, said, "Through all of our recycling programs, the company is making every effort to reduce the amount of pressure on our landfills."

The milling of aluminum airplane parts creates tons of aluminum scrap. The scrap is collected in solid form and chips transformed into hockey-puck shapes called "bricks."

Nearly 22 tons of "bricks" leave the



Takeoff eh...

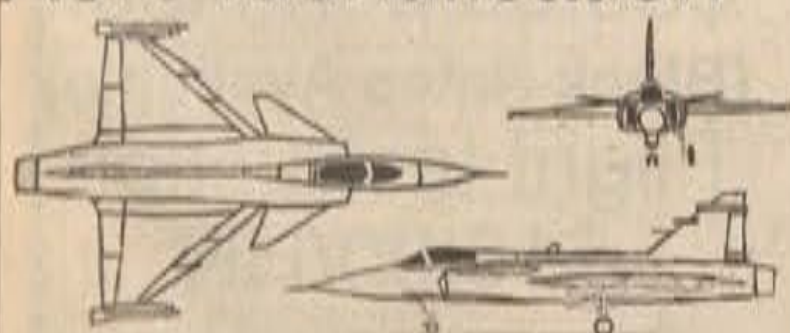
New 747-400 departs from environmentally safe factory.

division everyday. In 1989, Boeing recycled 6.25 million tons of processed aluminum chips. This year, due to increased production, the number will increase to 7.2 million tons.

These projects represent only a part of Boeing's overall efforts to improve the environment. It is an effort that will increase in the future. And fortunately for companies like Boeing, very often the most environmentally sound practices also cost the least.

"The bottom line is that it's the right thing to do," said Selby. "We're trying to make every process as sound as it can be. We recognize that our environment is at risk today, so we're committed to meeting or exceeding every environmental protection requirement. We want to ensure that the environment is clean and healthy, and that children and adults will be able to enjoy it for many generations."

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McDonnell Douglas MD-11 gains certification

by Tami Strout
Aeronautica Writer

The Federal Aviation Administration certified McDonnell Douglas' new MD-11 wide-cabin, trijet aircraft, which will permit deliveries to begin. The first delivery of the MD-11 long range trijet was to Mitsui & Co. of Japan and its U.S. subsidiary, Tombo Aviation. The first airline to receive delivery was Finnair of Finland.

The new MD-11 is powered by Pratt & Whitney PW4460 engines. Certification followed a flight test program that began with one P & W powered MD-11 on April 26 of 1990. Over all, 373 hours and 258 flights were required.

Five aircraft were used in the complete MD-11 flight test program, which included more than 2,000 flight hours. The completion of a 22,290 mile journey marked the end of the required flying for the program, during which it set three point to point speed records. The initial certification on the General Electric powered MD-11s was November

8, 1990.

The PW4460 develops 60,000 pounds of thrust, making it the largest Pratt & Whitney engine in current production.

The first delivery was in Long Beach, Calif. on December 14, 1990 to Mitsui Co. A Shinto purification rite and other Japanese traditions were observed during a ceremony celebrating the delivery.

On hand for the festivities were senior officials of the three companies and Delta Air Lines, which will lease the jetliner and a sister MD-11 from Mitsui/Tombo to begin serving a new route with them in early 1991 linking Orlando, Fla., Los Angeles and Tokyo.

Mitsui was one of three original 12 launch customers for the MD-11. President of Douglas Aircraft Co., Robert H. Hood said Mitsui, one of the world's oldest and largest trading companies, "committed both its prestige and financial resources to order five MD-11s in 1986 at the beginning of the

program. This was a bold move that gave other potential customers confidence and helped to launch the program."

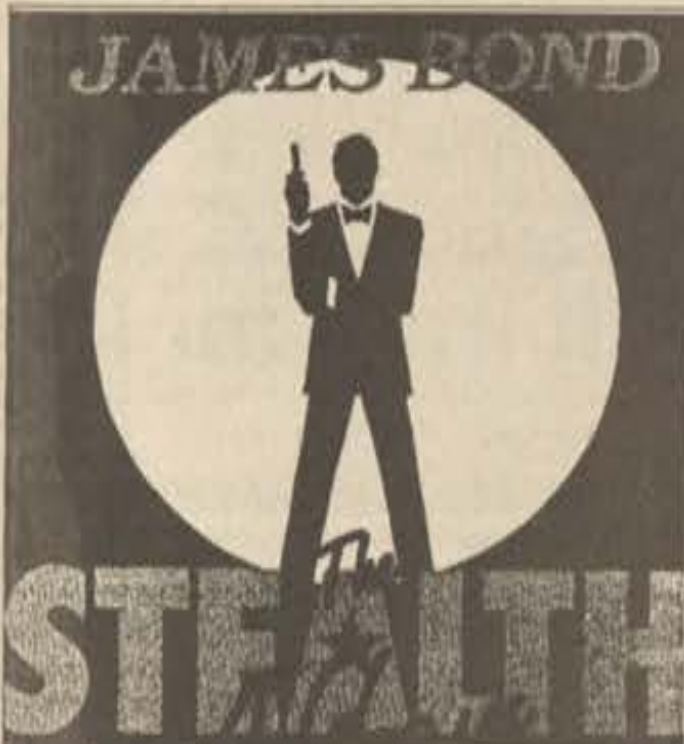
Unfilled orders and other commitments for MD-11s total 372.

Finnair recently became the first airline in the world to accept delivery of the MD-11. The first flight was January 10 of this year.

The big airliner took off from Helsinki, Finland and arrived five hours and 35 minutes later in Tenerife, Canary Islands covering a distance of 2,651 miles.

Capt. Cuervo Jaskari said the advanced technology MD-11 provided a "smooth and trouble free flight. We are pleased that the MD-11 is living up to our expectations."

The airline will operate the first MD-11 in charter service linking Helsinki with the Canary Islands five days per week. Initially it will carry up to 365 passengers. The airline plans to increase capacity to 400.



Bond called to return stolen Stealth

by Joe Cambron
Data Tech Editor

007 James Bond: *The Stealth Affair* (TSA) is an adventure game along the lines of Sierra's well-known *Leisure Suit Larry* line. This game, however, features eye-catching VGA color graphics and a new keyboard-less interface that changes the complexion of interaction between you and your IBM computer.

TSA starts with a stunning animated story-line. A shift-eyed pilot dons his helmet and goggles before leaving operations for a trip to who knows where.

The next scene shows a clandestine air field with an F-117A Stealth Fighter sitting on a tarmac surrounded by military police. In the distance, the light of a car grows less faint as it approaches the airplane. Upon arriving a suited figure exits the car and salutes, before climbing the ladder into the cockpit of the fighter.

With a wave from the ground crew, the airplane taxis to the runway and soars through the night sky. **Dateline: Washington, D.C.**

A shift-eyed pilot dons his helmet and goggles before leaving operations for a trip to who knows where.

The scene now moves to CIA headquarters. As the perspective slowly crawls up the side of the building, one room's lights pierce the darkness. Inside a CIA director invites British secret agent 007 to undertake the dangerous mission of recovering the stolen Stealth.

After this three minute movie, the real game begins.

Bond finds himself at an airport in a South American country that is harboring the missing craft. From there, the user must determine where to go, what to do, and what to use in order to recover the stolen plane.

Using a mouse for command

TSA is one of the first adventure games to use only the mouse to render all communication between the user and the game. For this reason, the process is rather complex, using both buttons at different times for different things. One thing the mouse interface does eliminate is the problem of using command words that the computer does not have in its vocabulary.

If one wanted to open a door, for instance, the player would hit the left mouse button. This would open up a small menu. From there, the left button would be hit on

OPERATE. Then the mouse cursor is moved to the object to be acted upon, and the action is taken.

Some might call this an improvement, but it is also cumbersome and slow compared to simply typing. Function keys can bypass the menus, but commands must still be highlighted with the cursor.

The beat

The music is excellent on both an Adlib sound board and a Soundblaster music system. Sources say that the Roland music system is unbelievably realistic. Both sound effects (i.e. Jet noise, waves, etc.) and music (the trademarked Bond score) make the purchase of a music system essential to derive full enjoyment of the game.

The manual is mostly non-descript in describing the game, probably out of fear that it will give away a secret. The manual does include a pesky copy-protection routine that involves matching colors from a design. The similarity of the colors and the differences between printed colors and displayed colors make this a challenging process.

All-in-all, the game is an excellent game with beautiful artwork and an amusing plot. The game is also available for the Amiga, and is essentially the same with that system.

Bond, James Bond...

Interplay's new James Bond game uses the mouse to control Mr. Bond.

Knights of the Sky vaults fliers into combat

by Joe Cambron
Data Tech Editor

Knights of the Sky is one of three IBM simulators featuring World War I and II air combat that are now hitting software store shelves. Besides this Microprose entry, Lucasfilm is preparing to release *Secret Weapons of the Luftwaffe* (a follow-up to *Their Finest Hour: The Battle of Britain*) and Sierra has released its *Red Baron* product.

Knights of the Sky is a very entertaining and addictive game that does a spectacular job of reproducing flight, while at the same time displaying complex 256 color VGA graphics. The aircraft is simple as it should be, but the play is anything but simple.

Several different variations of the game are included in the package. One allows a player to choose any Allied aircraft flown against the Axis powers during the entire first World War. Another option makes it possible for two players to go head to head by connecting their computers over phone lines or serial cables.

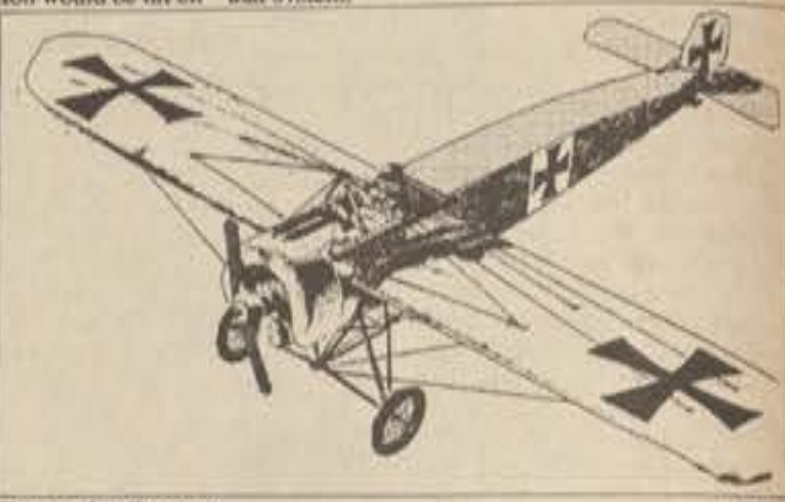
The most enjoyable of the three options is one that allows a player to make a historical contribution to the war by starting at its beginning. As time progresses and missions are completed, the war moves closer to its end.

The game can be frustratingly real. Machine guns do jam just as your sights pass over the elusive enemy. The "stringbag" the user flies improves

substantially over the course of the war, but the early 80 horsepower Nieuport aircraft are not effective.

With the engine sputtering and the throttle on full, your craft peters down the runway. If lucky, the takeoff will be uneventful, but it is also a great time for enemy aircraft to swoop down out of the clouds and pound your poor plane to the ground. Once in the air, the battle against the Germans is no easier. Formations of aircraft often surround your plane, particularly late in the war. White puffy clouds serve as a refuge for friend and foe alike.

The game is an excellent flight simulator as one could expect considering the era it takes place in. The flying is smooth, the video is flawless, and the Adlib sound is special.



Down in flames...

Shoot down the Red Baron in a simple, fun simulator.

CH Products' RollerMouse makes computer data entry a ball

by Joe Cambron
Data Tech Editor

Mice have become so popular in computing, thanks to Xerox and Apple, that new mice are now treated like car models. Each year brings incremental improvements for the new "model year." The primary players in the IBM side of this business are Logitech and Microsoft. Genius, CH Products, and a myriad of other companies are gradually driving a wedge into the two front-runners market lead by offering superior products and lower prices.

This year's mouse incarnations include cordless infrared or radio transmitting models, optically read mice, and even mice with small keyboards on them.

CH Products has turned the tables on the other mouse makers, by literally turning the mouse upside down. CH's RollerMouse product is really a trackball, like the kind used in the old game *Missile Command*.

The advantages to this are clear. By placing the moving ball on top of the "mouse", the user can eliminate constantly pulling the mouse cord into knots and reduce desk space by eliminating the mouse's "yard".

With mouse mat, mouse house, and other essential mouse accessories finding a new home in the garbage, the desk becomes much more functional. In addition, the RollerMouse is less likely to suck in the dust and dirt that eventually sound the death knell of conventional mice, that

is if you make use of the free RollerMouse House.

All is not wine and roses in RollerMouse country, however. The transition to a new device is easy from a software and hardware perspective, but is difficult for the human being.

The greatest trade-off involved in using one of these devices is the loss of easy access to mouse buttons. Without a true mouse it becomes difficult to hold a button beneath the ball (the opposite of your finger's location on a mouse), while rolling the ball to a precise position on the screen.

It is also difficult to be precise using the RollerMouse, not because of its workmanship but because it sometimes

continues to roll past your intended destination. These problems are minor, but these are the problems that are addressed in the many new models of mice that are released each year.

Difficulties aside, in the final analyses, my mouse is in a drawer and my RollerMouse is on my desk. The mental retraining this new mouse requires is less arduous than the constant cord hassles my old mouse caused.

The CH Products RollerMouse is well constructed and heavy with rubber feet to hold it stationary. The unit appears it could withstand a six foot drop onto carpeting, although thankfully testing was not conducted. Until radio mice hit the market and inadvertent drop testing from eight feet begins-RollerMouse wins my desk space.

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Venus provides new knowledge

by Dennis Adams
Space Technology Writer

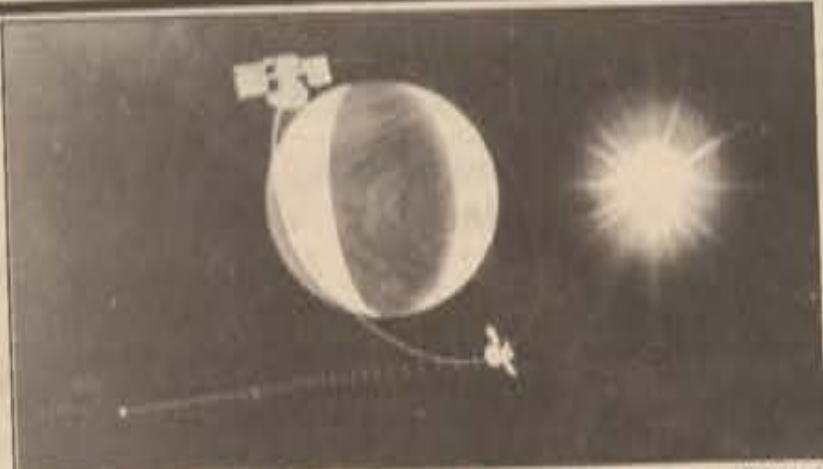
The Magellan spacecraft has successfully mapped over 55 percent of the surface of Venus. The mapping has given a great deal of information on Venusian mountain ranges, volcanic activity, atmosphere and even meteorology.

Venus and Earth are the only known planets with linear mountain belts. Venus' mountains also show evidence of tectonics but, unlike the ranges on Earth that have been eroded by rainfall and running water, Venus' mountains have not. The images also show that Venus' mountain belts are

being pulled apart by gravitational forces on the planet.

All of the mapped areas show widespread evidence of volcanism. New styles of volcanism have been discovered with lava channels that stretch hundreds of miles at several places on the plains.

Volcanic "pancake" domes have also been discovered on the plains. These structures appear to be up to 20 miles in diameter and a mile high. They are believed to be formed from a thick, pasty lava outflow. Similar domes form on Earth, but are much smaller and form in volcanic calderas.



Sending back the data...

This artist's drawing shows the Magellan spacecraft in an elliptical orbit around Venus and illustrates the mapping and data transmission phases of the mission.

Scientists were proven correct in their estimates of the number of impact craters on the surface of Venus. The fact that the smallest crater found is three miles in diameter shows the dense atmosphere has effectively shielded the planet.

see Magellan, page B6

Cosmic explorer maps the Milky Way

NASA News, Goddard Space Flight Center, Md. - For the first time, astronomers have mapped the distribution of nitrogen throughout our galaxy. The new observations were taken by an instrument on NASA's Cosmic Background Explorer (COBE), the Far Infrared Absolute Spectrophotometer.

Before COBE, it was not possible to map the whole galaxy in this way...

This all-sky survey, along with additional maps of carbon and dust, provides quantitative information that may enable scientists to understand better the heating and cooling processes that take place throughout the Milky Way.

"Before COBE, it was not possible to map the whole galaxy in this way, although these atomic emissions are the dominant way in which the interstellar gas cools," said COBE Project Scientist Dr. John C. Mather, who added that COBE's unique capabilities permit these all-sky measurements unencumbered by atmos-

pheric and instrument emission. Five months of data were used to produce the maps.

These new data show that carbon and nitrogen atoms are extremely widespread in the thin gas that fills the space between the stars. These atoms are created inside stars by nuclear reactions and then released

back into space by stellar winds or explosions at the ends of stellar lives.

The data were taken using the Far Infrared Absolute Spectrophotometer (FIRAS), one of the three instruments aboard COBE, NASA's first satellite primarily designed for cosmological studies.

COBE, launched from Vandenberg Air Force Base, Calif., Nov. 18, 1989, primarily studies the diffuse microwave and infrared light coming from the "big bang" at the beginning of the currently observable universe and from the first objects that formed after this primordial explosion.

Final preparations made for GRO mission

by Joshua S. Mussat
Space Technology Editor

Even though the first space shuttle flight of 1991 will not occur until early in March with *Discovery* on an unclassified Department of Defense (DOD) mission, many activities are taking place around the Kennedy Space Center to prepare for these upcoming missions. One of the prime examples is the Gamma Ray Observatory, which will be launched in April of this year.

The Gamma Ray Observatory (GRO), which is scheduled to be launched aboard the Space Shuttle *Atlantis*, STS-37, in April, was the subject of a science briefing and showing of the observatory at the Space Center last Tuesday, January 29.

Present at the briefing was P. Thomas Breakfield, Director of Shuttle Payload Operations, Kennedy Space Center, John R. Hraster, GRO Project Manager, Goddard Space Flight Center, Dr. Donald A. Kniffen, GRO Project Scientists, Goddard Space Flight Center, and the flight crew for STS-37, Commander Steven R. Nagel, Pilot Kenneth D. Cameron, and Mission Specialist Jay Apt, Linda M. Godwin, and Jerry L. Ross.

The Gamma Ray Observatory follows the Hubble Space Telescope as the second in NASA's "Great Observatory" series of astrophysics observatories. The other observatories are the Space Infrared Telescope Facility and the Advanced X-Ray Astrophysics Facility.

GRO is the first spacecraft to bear a complement of large, sophisticated instruments dedicated to studying a broad range of gamma ray energies. These instruments are the most advanced and most sensitive ever flown. They will study gamma ray sources 10 to 50 times fainter than those previously observed, expanding the volume of the observable

gamma ray universe up to 300 times.

The Gamma Ray Observatory is unique in several ways: 1) It is the heaviest unmanned NASA spacecraft ever launched, weighing more than 17 tons; 2) It is the first spacecraft completely designed through use of computer-aided design and manufacturing; 3) It is the first science payload with propulsion system that is refuelable in orbit; 4) Its payload will view the universe at the highest energies of electromagnetic radiation, a fact that will allow scientists to probe the most violent celestial objects.

The four primary instruments aboard the GRO spacecraft are the Burst and Transient Source Experiment (BATSE), the Oriented Scintillation Spectrometer Experiment (OSSE), the Imaging Compton Telescope (COMPTEL), and the Energetic Gamma Ray Experiment Telescope (EGRET).

Unlike the first great observatory, the Hubble Space Telescope, the Gamma Ray Observatory contains no mirrors since it is viewing in the gamma-ray segment of the electromagnetic spectrum, as opposed to Hubble's visible light segment. Even with these assurances, additional test-



T - three months, and counting...

The Gamma Ray Observatory (GRO), seen here in the Payload Hazardous Servicing Facility, is being prepared for its upcoming flight in April. The next step for GRO is the Vertical Processing Facility prior to installation in *Atlantis*.

ing, including eight end-to-end tests, have been conducted between the observatory and its control center. This was performed on the spacecraft to assure complete mission success.

During the first 15 months of operation, a detailed survey of the gamma-ray universe will be obtained. In later years, the instruments will view, in much greater depth, intriguing objects identified by the survey. The spacecraft is designed to have a minimum life of two years, but is expected to operate for at least six years.

Additional stories on the Gamma Ray Observatory and STS-37 will be forthcoming in future issues of the Avion.

NASA administrator remembers Challenger

NASA News, Washington, D.C. - NASA administrator Richard H. Truly issued the following message to NASA employees upon the fifth anniversary of the Space Shuttle *Challenger* accident:

"Today marks the day that we in the NASA family remember the seven astronauts who flew aboard *Challenger*. We will never forget them. It has been through your tireless efforts in the interim that we have profited from the important lessons we learned; I am extremely pleased that, [today], we have a completely revitalized Space Shuttle program.

In the 28 months since we returned to flight, the Shuttle has flown safely 13 times. In fact, three of these missions were in a 2-month period beginning last October 10. The Shuttle's performance on every one of these flights has been outstanding, and flight safety has been the keystone of

our success. On April 30, the Shuttle *Endeavour* will roll out at Palmdale, California. Soon, it will join the Shuttle fleet in taking into space a succession of scientific missions that will greatly enhance our understanding of the universe and our planet.

Endeavour and her sisterships are unique national resources. Their capabilities are unparalleled. You, the men and women of the NASA/contractor team, have worked with dedication to reaffirm U.S. leadership in space exploration. Such dedication must continue, as we tackle the many challenges of carrying out our nation's civil space program in the 1990s and beyond. This is, perhaps, the greatest tribute we can make to our friends who flew on *Challenger*.

On this day, our thoughts are both with our friends, and on the brilliant successes that lie ahead."

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by Gary Larson



Although history has long forgotten them, Lambini & Sons are generally credited with the Sistine Chapel floor.

by Mike Peters



Space research program announced

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

Naval lecture offered

The School of Graduate Studies and Research is pleased to announce a lecture on Research and Development of Training Systems for the US Navy and Marine Corps. The presentation will be on Tuesday, Feb. 12, 1991 from 1:25 to 2:25 p.m. in the Riddle Theater (A Building, Room 101). The guest speaker, Mr. Hank Okruski, Chief Scientist and Director of Research and Engineering at the Naval Training Systems Center, will speak on "NTSC: Its Mission, Plans and Programs, and R&D." Faculty, staff and students are encouraged to attend. For additional details, contact the school of Graduate Studies and Research.

Spring degree applications available

Applications are being accepted for those expecting April 1991 degree completion. Come to the Registration and Records Office to complete an application to receive an evaluation. For those students anticipating summer 1991 graduation, the Records and Registration Office suggests that you fill out your Degree Completion Application for a preliminary evaluation for degree completion. It is especially important for those summer applicants anticipating attendance at the Spring 1991 ceremony to apply at this time. Applications are available in the Registration and Records Office on the second floor of the John Paul Riddle Student Center Extension.

Middle East support group meets

A Support Group, for the ERAU Community who have family/friends serving in the Middle East, will meet on Thursday, Jan. 31, 1991 at 7 p.m. in the Student Center, Room 114D (Conference Room next to the switchboard). If you would like additional information, or if you are interested and unable to attend, contact the Counseling Center, at ext. 6035.

Primary Flight Tutoring Session

A new study group will begin on Tuesday, January 29th. The study group is designed to help students having difficulties in FA110, FA105, AS150, and AS180. It will run every week on Tuesday and Wednesday nights from 1830 - 2000 in room G105 until the end of the semester. There will be no set schedule of topics to be discussed. Students from FA417, the Certified Flight Instructor course, will be available to help students on a one to one basis. Students who have questions or don't quite understand something please bring appropriate materials in that area of concern. All students are welcome. This is an initial effort, if demands warrants the times and days can be expanded. If there are any questions contact Ken Stackpoole at 6890 or Mike Wiggins at 6832. This has been coordinated by ERAU flight DEPT. and SOA.

Financial aid packets available for coming school year 1991

Financial Aid packets for the 1991-92 school year are available now in the Financial Aid Office in Spruance Hall. Apply for next year's financial aid now. Priority will be given to everyone who applies before April 15. However, since applications are processed in the order that they are filed, applying early will give you an advantage. You can do some things to speed up the financial aid process for yourself: 1) Apply early, 2) Read the instructions thoroughly and carefully, 3) Provide accurate data on the application, 4) Quickly provide documentation requested by the Financial Aid Office, 5) Check your ERAU mail box frequently. All campus offices will communicate with you via your box, 6) Ask questions. The Financial Aid Office is located downstairs in the north end of Spruance Hall. Our service windows are now open from 8 to 5 p.m., Monday through Friday and the phone number is 239-6300.

Senior Class to hold meeting

The first meeting for all April, 1991 graduates will be held on Tuesday, February 5, 1991, at 8 p.m. in the Student Center. I will review graduation information at that time. Since there is no rehearsal for graduation, it is very important that you attend. Elections for Senior Class President and Vice President will also be held. If you are interested in running for either office, please schedule a time to meet with me to complete your application by Friday, February 1, 1991. The Senior Class Council will also be secured at this meeting. This group consists of 20 to 35 volunteers from the class, who will secure discount hotels for graduate's guests, raise funds for the class party, keep the class informed of their progress, and socialize prior to graduation. If you are interested in being on the council, we will meet immediately after the graduation meeting to get organized.

Student debt counseling available

Staff members from Student Financial Services and the Financial Aid Office are available to meet with you to assist you in planning the payment of your outstanding tuition. Please note, this is not a payment-on-demand session. This is a chance for you to meet with University personnel to discuss your debt, how to meet your payment deadline and remain enrolled. If you would like to take advantage of this service, please contact the Student Financial Services Office at 239-6285 to arrange an appointment.

Bookstore pays tribute to soldiers

Not a day goes by that we are not confronted with the reality of the war in the Persian Gulf. To many of us that reality many mean a close friend, brother, sister, mom, dad or other loved one serving in a branch of service somewhere in or near Saudi Arabia. The University Bookstore commends the brave efforts of our troops and to show that our thoughts are with them we are dedicating the store front window to an "Operation Desert Storm" display entitled "You're in our hearts and in our minds." If you have or know someone who is serving in the Persian Gulf we invite you to bring a picture of that person to the University Bookstore and place the picture on the store front window display. You may put the name of the person on the front of the picture if you want to. Please be sure that on the back of each picture you place your name and box number or Dept. number ensuring that you will get your picture back at the end of campaign. We thank you for your support. Please come and see us at the Bookstore.

Magellan

(continued from page B3) Evidence also points to the fact that the thick poisonous atmosphere was not recently formed. Surface images indicate it may be in excess of 400 to 800 million years old. Magellan has also revealed indications of turbulent surface winds. By studying the wind streaks created on topographical obstacles, a great deal of meteorological data about circulation of the atmosphere near the surface can be gained. Magellan has completed 118 days of mapping and 973 orbits. Scientists have received information from

819.6 mapping orbits and on 45 percent of the planets surface. A loss of information occurred last November when the sun was between Earth and Venus, making transmission between the planets impossible for fifteen days. There have been other losses of data since mapping began last September 15, due to spacecraft problems and difficulties at the various Deep Space Network stations. But of the area covered by mapping orbits, only 2.4 percent has been lost.

THE Weekly Crossword Puzzle

ACROSS

1 Wooden pipe
5 Snakes
9 Inmate
12 Merit
13 Hall
14 Former boxer
15 Test
17 Empowers
19 Confirmed
21 Every
22 Head of Catholic Church
24 Teutonic deity
25 Distant
26 Mellow
27 Reply
29 Ma's partner
31 Blushing
32 Note of scale
33 Helium symbol

34 Three-toed sloth
35 Symbol for tellurium
36 Appraises
38 Southwestern Indian
39 Broad stripe
40 A continent ably
41 Greek peak
42 Let it stand
44 Painter
46 Grapple
48 Long, wearying time colloq
51 River island
52 Bundle
54 Emerald Isle
55 Genus of cattle
56 Sarge's dog
57 Tear

DOWN

1 Cosset
2 Corn plant part
3 Clutched
4 Trap
5 Equally

6 Guides
7 Body of water
8 Health resort
9 Pertaining to cheek
10 Fish sauce
11 Piece of dinnerware
16 Benthic
18 Uprate animal
20 Mercenary
22 Separate
23 S-shaped molding
25 Tolls
27 At a distance
28 Grain
29 Fruit seeds
30 On the ocean
34 Rigorous
36 Large tubs
37 Disquiet
39 Vegetable pie
41 Willow
42 Kind of mop
43 Group of three
44 Landed
45 Exotic
47 Couple
49 Alcoholic beverage
50 Conclusion
53 River in Italy

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