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AERONAUTICA

Aeronautica.....	B1
Space Technology.....	B3
Classifieds.....	B9
Comics.....	B5
Notices.....	B6

Persian Gulf War starts with a bang over Baghdad



War Eagle...
The F-15 and other high-tech weapons are proving their worth in their first all-out war.

Central Saudi Arabia (AP) America's air war against Iraq opened with hundreds of bombing sorties aimed at stripping Iraq of an effective air defense. But the first daytime raids were frustrated by bad weather and intense enemy anti-aircraft fire.

However, "I think it's been a good start," said Col. Dave Eberly, who flew an F-15E fighter-bomber in the first wave of attacking aircraft against Iraq.

After a day and night of nearly continuous raids

launched from the largest U.S. air base in Saudi Arabia, the 43-year-old operations officer of the 4th Tactical Fighter Wing Provisional said that every plane in his wing had returned safely and without damage.

However, Eberly cautioned that Saddam Hussein "still has a formidable defense, and we're after every piece of that... each one of the targets is well defended."

In the first strike of the war, Eberly said that he and fellow F-15E crewmen saw some Iraqi MiG interceptors and

encountered intense anti-aircraft fire.

"It just lit up the sky," he said, explaining that the Iraqis were shooting all their anti-aircraft guns at the sound of the approaching jets or after being alerted by early warning radar.

"All the good guys were with us, and all the bad guys were in front last night, which made it easy," he said.

Eberly also noted that unexpected bad weather affected the daytime raids by F-16A fighters. Cloud cover over Iraq and Kuwait Thursday morning worsened through the afternoon, which F-16A pilots said they hadn't expected.

An afternoon raid of about three dozen F-16A fighters encountered heavy cloud cover and many pilots returned to base with their full bombloads.

"We wish the weather was a little bit better so we can go in and do our job," said Capt. Ted Limpert, 31, of Syracuse, N.Y.

Limpert, an attorney for an environmental firm in civilian life and flying his first combat mission, quoted an Air Force general as saying, "No target is worth dying over so we'll just have to (try) another day."

Limpert was flying for the 138th Air National Guard Tactical Fighter Squadron, based at Syracuse. He said that the more experienced pilots, who were veterans of the air campaign in the Vietnam War, flew Thursday morning and afternoon as mission commanders.

The 138th, with their slogan "The Boys From Syracuse" painted on the tails of their jets, were flying their mission with the 157th Air National Guard Tactical Fighter Squadron, based in Columbia, S.C. The 157th is known as the "Swamp Fox" and the outline of the fox's head is stenciled on the side of squadron jets.

Two of the Swamp Foxes, Capt. Thorne Ambrose, 36, of Columbia, S.C., and Capt. Jay Johnson, also of Columbia, flew their first combat mission Thursday afternoon.

Ambrose said he had good training to be a fighter pilot. "I used to fly for Eastern Airlines. Working for Frank Lorenzo kind of got me used to working in a war zone. This isn't near as dangerous," he said.

Former Eastern boss Lorenzo continually battled with pilot and other unions.

"There was a lot of stuff being fired at us just about everything and the kitchen sink was coming up through the clouds at us. It was pretty spotty," Ambrose said. "There were smoke trails in the blue sky above us where

some of the SAMs were going. I saw one just go straight up behind me, just straight up in the sky, and blow up," he said.

"We were up in the target area probably for 10 or 15 minutes. It just seemed like time stood still. There were times that I was supersonic and it just seemed I wasn't going anywhere," he said.

"I only had 40 miles to go, and it seemed like I couldn't get there, to the border. Feet, don't fail me now!" Ambrose exclaimed.

"I wish he'd (Saddam) wave the flag tonight," he said. Johnson was asked why all the wing's fighters had survived the intense anti-aircraft fire.

"Hopefully all the electronic stuff we have and the tactics that we're using are working, and probably God was looking out for us, too, because it was really very heavy up there."

Johnson said flying in combat concentrates the mind because it's real "and people are trying to kill you."

"I have a wife who's three months pregnant, and I can't believe I'm here," he said.

The mortal reality of war was evident in the operations. The jets took off alone, instead of the normal practice of taking off in pairs, so that if one heavily loaded plane had an accident the explosion would not damage or destroy the other's plane.

The plane waiting to take off also faced away from the runway as the final safety pins and flag were removed from their bombs and missiles.

This practice, too, was designed to prevent a runaway missile from streaking down a runway where planes were lined up to take off.

At least one F-16 pilot returned from his mission with so-called hung bombs; bombs that had failed to drop when he hit the release button in the cockpit.

The plane landed with these armed bombs still slung under the wings, a dangerous practice that is generally avoided in peacetime training flights.

According to Lt. Col. Tom Webster, 43, of Baldwinsville, N.Y., the maintenance officer of the 138th, another F-16 "returned so low on gas that he landed straight in, without first flying over the airfield and turning to land."

"When we checked, he had 800 pounds of fuel remaining which was only enough for one more go-around," Webster said.

"I used to fly for Eastern Airlines. Working for Frank Lorenzo kind of got me used to working in a war zone. This isn't near as dangerous," he said.

F-15E dominates the skies over Iraq

by **Erinn Moore**
Aeronautica writer

During the war in the Persian Gulf, the aircraft that was part of the initial assault on Iraqi missile installations and command and control facilities was the McDonnell-Douglas F-15E or "Strike Eagle."

According to pilot press, the Mach 2.5 F-15E is a two-seat dual role version of the Eagle which is capable of performing long-range (2,400 nm), deep interdiction (685 nm combat radius), high ordinance payload air-to-ground missions by day or night, and in adverse weather, while retaining its proven air-to-air capabilities.

The "E" version was modified from a two-seat F-15B. The rear cockpit was upgraded with four multi-purpose CRT displays for radar, weapon selection, and monitoring of enemy tracking sys-

tems. The front cockpit modifications are: a wide field of view HUD, new controls, and three color CRTs providing multi-purpose displays for improved navigation, weapons delivery and systems operation, including moving map displays, weapons options, precision radar mapping, and terrain following radar.

For night and all weather missions, the F-15E has advanced radar and infra-red systems. A new high resolution synthetic aperture designed by Hughes allows the Eagle to have an accurate "blind" weapons delivery. Integrated internal countermeasures equipment is fitted.

A significant portion of the Eagle's structure was redesigned to create the F-15E. To accommodate the new avionics, the internal fuel capacity was slightly reduced; therefore the Eagle can utilize conformal fuel tanks with a full complement of

bombs carried on integral, tangential weapon racks. In addition to carrying a variety of guided and unguided bombs and other ground weapons, the F-15E retains its air superiority performance and weapons (AIM-7 Sparrow, AIM-9 Sidewinder and AIM-120 AMRAAM missiles).

An added plus for the F-15E is a digital, triple redundant Lear Siegler Astronautics flight control system installed permitting coupled automatic terrain following, and a Honeywell ring laser gyro INS which provides quick reaction alignment and improved navigational accuracy.

Standard armament for the F-15E Eagle is: 20mm M61A1 six barrel gun in starboard wing root, with 512 rounds. General Electric lead computing gyro. Provision on underwing (one per wing) and centerline pylons for air-to-air and air-to-ground weapons and external fuel tanks. Wing pylons use standard rail and ejection launchers for AIM-9 Sidewinder and AIM-120 AMRAAM air-to-air missiles; AIM-7 Sparrow and AIM-120 AMRAAM can be carried on launchers on the centerline station or on tangential stores carriers on the conformal fuel tanks (maximum total load: four each AIM-7 or AIM-9, up to eight AIM-120). Single or triple rail launchers for AGM-65 Maverick air-to-ground missiles can be fitted to wing stations only. Tangential carriage on CFTs provides for up to six bomb racks on each tank, with provision for triple ejector racks on wing and centerline stations. The F-15E can carry a wide variety and quantity of guided and unguided weapons.

An AXQ-14 data link pod is used in conjunction with the GBU-15; LANTIRN pod illumination is used to designate targets for the GBU-12 and -24 laser guided bombs, AN/AWG-27 armament control system.

With the impressive array of weapons and performance of the world's finest air superiority fighter, the air campaign in the Persian Gulf should provide devastating destruction of the Iraqi military targets and spare many Allied pilot's lives.



Agile aircraft...
The author stands beside the agile Pitts Special after returning from an introductory aerobatic flight.

Phoenix East Aviation offers aerobatic training

By **John McDermott**
Aeronautica Editor

There is not a pilot around who has not thought of flying aerobatics. All pilots should experience aerobatic flight not only for the fun of it, but to see what you, and the proper aircraft, are capable of.

Phoenix Aviation has three unique aircraft available to broaden a pilot's qualifications. There is an L-4, which is a 1943 military observation version of the Piper J-3 Cub that is used for tail dragger training. The other two aircraft used for aerobatic training are a Cessna 152 Aerobat, and a Pitts S-2A.

Last week I had the opportunity to learn about the aerobatic courses offered at Phoenix Aviation and take an introductory flight in the Pitts S-2A. The Pitts is owned by Todd Aspodorian, who instructs in the aerobatic courses. There are two aerobatic courses offered, a five hour introductory course and a ten hour intermediate course.

In the five hour course the student receives two hours in the Aerobat and three hours in the Pitts. The student learns the basics such as the aileron roll, snap roll, and loop. In the ten hour course the student learns, in addition, the maneuvers in the International Aerobatic Committee's Sportsman's Sequence.

The Pitts S-2A aerobatic trainer has a Lycoming AEIO-360, 200 horsepower engine. After reviewing the emergency procedures and how to use the parachute, we did a preflight and then I climbed into the stark cockpit.

There are only a few instruments in the cockpit: airspeed, altimeter, G-meter, and engine R.P.M. It took me a few minutes to buckle all the straps for the parachute and seat. Once that was done, the engine was started and we taxied out, did a run-up check, and then did a max climb takeoff. I took the controls while flying to the practice area to get a feel for the airplane.

Once in the practice area the instructor did clearing turns and proceeded through a few basic maneuvers, including a roll, spin, and loop. I took the controls for a loop, but it was not very circular. We then did a few more advanced maneuvers such as a Cuban eight, hammerhead, and inverted flight.

I enjoyed the flight, anticipating the maneuvers beforehand, was worse than actually doing them and we pulled a maximum of four G's during the flight. I hope to learn aerobatics in the near future and recommend any pilot getting some aerobatic training.

For more information on the aircraft and programs available here contact Phoenix Aviation.



Strike Eagle...
The F-15E has proven itself in its first combat missions over Iraq. This newest version of the Eagle is a dedicated all-weather night attack bomber.

Student earns Spaatz Award from Civil Air Patrol

by **John McDermott**
Aeronautica Editor

Embry-Riddle Aeronautical University Aerospace Engineering student Julie Abel recently received the General Carl A. Spaatz Award from the Civil Air Patrol.

The Spaatz Award is the highest award a cadet can earn in the Civil Air Patrol and denotes the rank of Cadet Colonel. The award was presented before the end of the Fall trimester by University President Ken Tallman. Present at the ceremony were Ms. Abel's family, Embry-Riddle faculty

and fellow members of Civil Air Patrol who are students here. Also in attendance was Lt. Col. Don Stallings, the Air Force Liaison Officer for the Florida Wing of Civil Air Patrol.

To earn the Spaatz Award, a cadet must pass written tests in leadership skills and aerospace education, in addition to completing a written essay and physical fitness test. The Spaatz

Award marks the completion of the cadet program and several years of hard work. Since May of 1982 when Julie joined the St. Louis Squadron of the Missouri Wing of C.A.P., she has progressed from

Cadet Airman, and held many positions including Flight Sergeant and Cadet Commander. Her area of expertise is ground search and rescue operations.

The Spaatz Award marks the completion of the cadet program and several years of hard work.

Lecture:

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SPEAKER: Dr. Leonard D. Indianer
 President Int'l Orthokeratology
 Section of the National Eye
 Research Foundation

PLACE: Student Center
 Conference Room
TIME: 6:30pm
DATE: February 11, 1991



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Shuttle replica premieres at Spaceport USA

by Joshua S. Mussat
Space Technology Editor

Over the Christmas holiday, a gift of huge proportions was unwrapped, unveiling a full size replica of the Space Shuttle orbiter. The shuttle, called the *Ambassador* is a 1:1 scale model which is 122-feet long, and has a 78 feet wingspan and 56 feet high.

According to Spaceport USA officials, where the exhibit is located, the model is the next best thing to climbing in a real Space Shuttle. The replica, made of steel and fiberglass, offers visitors an astronaut's view of a Space Shuttle flight deck, crew quarters and cargo bay.

Visitors approach the exhibit from the rear of the orbiter to a stairway located behind the nose gear. While waiting to enter the orbiter, visitors can watch a short five minute video. The video presentation, entitled "The Space Shuttle - Shuttle Processing," is an audio/visual presentation of some of the sights and sounds of a shuttle mission.

When people enter the orbiter, they are immediately placed inside the 60 feet by 15 feet payload bay. The first noticeable part of the orbiter is the airlock and the mid deck. The mid deck contains the crew living and working quarters and storage lockers for flight control equipment. The wall between the mid deck and the payload bay is

cut away, so visitors can see how big, or how small their quarters are.

After viewing the mid deck, visitors continue into the back of the orbiter to view the payload bay in which the Canadian remote manipulator arm and a blue and gold satellite are in their pre-launch position.

Visitors then walk up a second flight of stairs to view the flight deck. Again the wall between the flight deck and the payload bay is cut away, so visitors can see where each of the crew members sit during the launch and landing phases of a mission. The flight deck contains seats for as many as five crew members and all flight control equipment necessary to sustain the astronauts.

Visitors then leave the orbiter, but not before viewing the payload bay and mid deck once more.

Two attendants are on duty at all time to assist visitors with any questions.

The *Ambassador* was built by a central Florida firm and constructed



photo by Brad Dinkley

Looking nose to nose...

A replica of a Shuttle orbiter arrived at Spaceport USA over the Christmas holiday to the delight of visitors. The *Ambassador* will be open to the public daily until April.

by a crew of 39 persons working for 18 months. The orbiter is transported in 18 huge shipping containers. Once at its destination, it takes approximately 20 days to assemble the orbiter.

Originally constructed for showing at the Expo '92 World's Fair in Seville, Spain, the owners first wanted to premiere *Ambassador* to the public at Spaceport USA. Its name is derived from the fact that it is destined for extensive international showing.

Would-be travelers, however, would be wise to make plans to visit Spaceport USA by early April to be assured of this rare opportunity for an inside look at the world's only full-scale replica of a Space Shuttle. The exhibit is open daily 9:00 a.m. thru 5:45 p.m.

Arianespace has successful launch

by Michael D. Fried
Space Technology Writer

Ariane mission 41 successfully started the year off for the European launcher after placing two communication satellites into orbit.

The Ariane 44L launcher lifted off at 6:10 p.m. EST from its launch site in Kourou, French Guiana. Placed into proper orbits were the ITALSAT 1 and the EUTELSAT satellites.

The next launch is scheduled for February 21... with the launch of the ASTRA 1B and the MOP 2 satellites.

The ITALSAT 1 was built for the Italian Space Agency (ASI), and is a experimental communications satellite used to establish a digital network via satellite covering Italy.

The EUTELSAT 1F2 is the second model in the new generation of telecommunications satellites of the European organization.

The mission was scheduled for January 15 with a window extending from 6:09 p.m. to 7:18 p.m. The actual launch took place at 6:10:49 p.m. on Tuesday. Company Chairman and CEO, Charles Bigot stated, "This first 1991 launch is yet another example of the remarkable strength of the European space industry."

At the point the Ariane 44L launcher reached orbit, it had a perigee of 200.5 km compared with the target of 200.0 km. The Apogee was at 35,922

km for a target of 35,940 km, and the inclination was 7 degrees inclined to the equator.

The low inclination orbit brought the flight path almost due east towards the west coast of central Africa. The

ITALSAT 1 was separated first at 19 minutes into the flight. Following was the EUTELSAT 1 with a separation occurring at 23 minutes which marked the end of the Ariane mission.

The final resting place for the two satellites was at 13.2 degrees east over Central Africa for the ITALSAT, and 10 degrees east over Gabon for EUTELSAT.

The Ariane rocket was an L version which means four liquid propellant strap-on boosters. Other versions are available using a combination of solid and liquid propellants depending on the mission requirements.

Arianespace has a backlog of 36 satellites to be launched minus the two just launched. Eighteen of those are European while the remaining eighteen are for customers outside of Europe.

The next launch is scheduled for February 21 using an Ariane 44LP (two liquid and two solid boosters) with the launch of the ASTRA 1B and the MOP 2 satellites.



We have liftoff... An Ariane launch vehicle, moments before liftoff.

NASA creates artificial light show

by Dennis Adams
Space Technology Writer

This month a joint NASA-US Air Force science group will be using the Combination Release and Radiation Effects Satellite (CREES) to test the possibility of creating an artificial aurora. CREES will release clouds of barium and lithium vapor into the Earth's magnetosphere.

The purpose of the experiments is to study the Earth's ionosphere and magnetosphere and to monitor the effects of the space radiation environment on sophisticated electronics. The artificial cloud-release experiments will also help scientists to understand the process which cause auroras by using artificial charged-particle clouds to induce them. By observing the cloud motion, scientists will be able to measure electrical fields in space and will see how they interact with charged particles to form waves and better understand how Earth extracts energy from the solar wind emanating from the sun.

The experiments will result in clouds of artificially injected charged particles locally and temporarily changing

the structure of the charged particles and the magnetic fields where they occur. When illuminated by the sun, the clouds will show up as bright red, green and purple patches appropriately the size and brightness of a full moon. The release will have no adverse environmental effects.

The magnetosphere is the region where Earth's magnetic field is exposed to solar wind, trapping energetic electrons and ions. The trapped particles are locked into spiral orbits around the lines of magnetic force. The particles also bounce back and forth along the field lines from one end to the other, coming very close to the Earth but turning around or "reflecting" just above the atmosphere.

An aurora is the glow caused when the charged particles leave their stable paths and go racing up into the high thin atmosphere where they smash into the atoms and molecules of air causing them to glow. This is very similar to the concept used in a TV screen. When the particles leave the magnetic field at a very slow rate, the aurora will be very dim; but, when they pour out, a very bright aurora,

see Aurora, page 65



photo by Brad Dinkley

The Ambassador has landed...

Visitors to Spaceport USA will have an extra treat this year, the chance to see a space shuttle -- from the inside. Visitors will have a chance to see the living and working quarters of the astronauts in the full size model.

THE STUDENT FLIGHT ADVISORY BOARD

7:30 PM WANTS YOU FLIGHT ROOM

To attend an OPEN FORUM for flight students this Thursday January 24. The advisory board is comprised of flight students who are familiar with the flight line. Topics addressed will include the safety stand down and any other questions that Aero Science students would like answered. This is your opportunity to talk about anything concerning the flight line.



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RAZZLES

Adding a modem to a PC can be simple and cheap

by Joe Cambron
Data Tech Editor

A modem is a device that allows computer to communicate with other computers over conventional phone lines. Installing one in an IBM computer is usually simple, and it opens new uses for your investment, increases resale value of your computer, and saves costly professional installation fees.

All you will need to undertake this mission is a flathead screwdriver, phillips screwdriver, ball point pen, and tweezers (optional).

The first thing to do is to select a modem. Modems come in different speeds: 1200 bits per second (\$50), 2400 bits per second (\$80), and 9600 bits per second (\$500). Brand names are not very important, but two things are.

One of those things is a warranty because most modems do not break, they simply never worked in the first place. The other important quality of a modem is 100% Hayes compatibility, nearly all modems have this capability.

Almost any port in a storm...

Before beginning the installation, it is important to determine the use of your computer's serial ports. These ports are used primarily for modems and mice, as well as a few printers. They are designated as COM ports. These ports are numbered to identify which are used. Only one device may be used on each port. Therefore, it is necessary to find out which are used.

COM1 and COM2 are used most often in IBM computers. If you use a mouse, it will be necessary to scan two files that are found in your computer's root directory (the directory that your computer first reads data from when it is turned on). These files are titled AUTOEXEC.BAT and CONFIG.SYS. Upon locating the first file, enter TYPE AUTOEXEC.BAT. The resulting lines of data may include a statement such as MOUSE or MOUSE /2 or

CHMOUSE 2 or LMOUSE. If a statement similar to one of these is listed, and it is followed by a 2, then your mouse is on COM2, otherwise, it is on COM1. Also look for statements such as MODE LPT1:=COM1. If reference is made to a COM, then the number that follows it is in use.

If none of these statements are found then repeat the same process with the other file (TYPE CONFIG.SYS). Having ascertained this information, now the real installation can begin.

The most important thing to do before working on a computer, or any other electrical device-for that matter, is to turn off the power and unplug the unit.

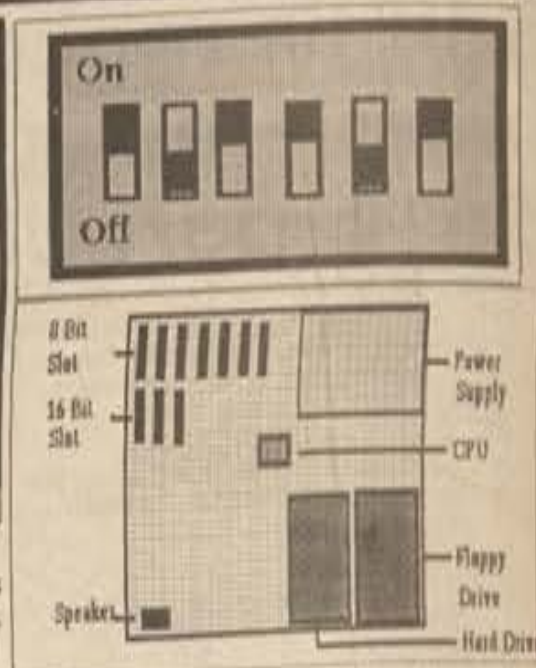
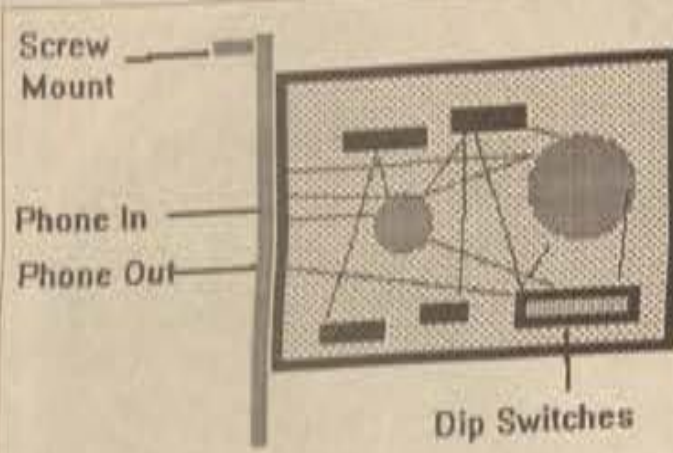
The most important thing to do before working on a computer, or any other electrical device-for that matter, is to turn off the power and unplug the unit.

Next, remove the five mounting screws found at each corner and at the center of the back panel of the computer (most IBM XT/AT or compatibles). Use a screwdriver (whichever type is necessary) and save the screws.

After sliding off the computer cover slowly and carefully, locate the power supply (see diagram). Avoid touching exposed wires, and never remove the power supply cover. It is necessary, however, to touch the metal top of the power supply to ground the person who will be installing the modem.

Now, remove the modem from the cover and locate the documentation. In the accompanying booklet, directions will be given to set dip switches (see diagram) to configure the modem for the COM port it will be using. Set the switches using a ball point pen to slide the on/off markers. Tweezers may be needed for some types of switches. Use a COM port that is not already taken when setting the card.

Modem expansion cards are what is known as eight bit expansion cards. These cards may be placed in any unoccupied expansion slot on your computer's bus. If you are the owner of an AT computer, it would be a waste to install it in an sixteen bit slot (see diagram), although it will work



The silicon abyss...
A modem is an expansion card (above left) that fits in an 8 bit slot (right). The modem must be configured using switches (above right).

there. Find a slot and remove the outside slot cover from your computer (Remember: Do Not Touch Exposed Wiring With Power Connected). Now, turn on the computer. Look for errors as the computer runs its internal diagnostics.

One of these errors would probably result from improperly seating the card in its slot. Once through this stage, run a program that uses a mouse (if you have one). Next, run a program that uses your printer (if you have one). Finally, execute a communications program (one usually comes with the modem). Set the program for the COM port you have selected as described in the manual. Now type ATDP5555555 from inside the program. Listen for a dialing sound.

Protecting your investment
If anything seems to be working properly, it is time to contemplate the purchase of a device called a line spike protector. Spike protectors are used by many people to protect their electronics from voltage jumps which may momentarily increase 220 volt outlets to 10,000 volts or more. Many people do not realize, however, that phone lines also may carry deadly (to computer) spikes. Power spikes in telephone lines may be sufficiently large to melt the silicon used on computer chips.

If any of these tests are unsuccessful, no damage has been done, but a COM port conflict has developed. Apparently, two devices are using COM1 or COM2. If this is the case, power down, disconnect the power cable, and reset the modem for the other COM port-as described in the manual.

If everything seems to be working properly, it is time to always: have the proper tools, know what information you will need, disconnect the power, do not open the power supply, ground yourself, do not force anything to the point of breaking it, and do not close the case until you are sure everything works. With your case now returned to its proper shape and those easily lost screws properly inserted, you may now put your new toy to good use.

Logitech's Scanman economically imitates art



this was accomplished by typing in the data and re-drawing whatever graphics were necessary by hand. This technique was soon deemed much too arduous for all but the most casual computer users.

It was for this reason that the scanner came into existence. Scanners take images or text from a piece of paper or another flat surface and digitally input them into a computer, much like a camera would if it could connect to a PC. There are at least two types of scanner physical designs.

One is called a "flatbed", and it looks and acts much like a copier. The other is called a handheld scanner, and the name is relatively self-explanatory.

Flatbed scanners contain many moving parts and are thus much more expensive than handheld scanners. For this reason, handheld scanners are more of a reality for the casual computer user.

Handheld scanners carry their own problems, however. Logitech and its Scanman Plus are the leaders in technology and sales, respectively. The most gnawing problem with the handheld scanners stems from its very purpose: to save cost by using human motion to move the scanning element along a

printed page.

The wheel-equipped device senses movement and uses an indicator light to warn of excessive movement speed. Moving in a perfectly straight line, though, may require more practice than learning to bench-press twice your own weight.

Optical Character Recognition (OCR) is the process of taking a typed page and converting it to a page in your word processor, while not having to type it. Special software must be purchased to take advantage of this option, without it, images are the Scanman's only purpose.

Testing of the Scanman found that the uneven scans produced by human movement are

detrimental to OCR. Character loss was greater than 25% in some tests and as little as 12% in others.

The Scanman uses what is called dithering to simulate 16 shades of gray. It is a poor substitute for gray-scaling scanners which use 256 shades of gray to produce much better results. Logitech also produces a gray scaling scanner for a few hundred dollars more than the Scanman Plus.

Essentially, the Scanman Plus is best when used on black and white images. The nearly \$300 list price can be nearly cut in half by purchasing the unit through the mail. Recommendation: Save your money for a 256 shade gray-scaling scanner.

Digitized, synthesized...
This Starship was scanned in with the Scanman.
by Joe Cambron
Data Tech Editor

Ever since the computer was invented, users have sought a way to enter documents directly into a computer. In the beginning,

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Calvin and Hobbes by Bill Waterson

SHH! SHH! SHH! SHH! SHH! SHH!

HA HA HA! DIE, SNOW GOON, DIE!

MORE WATER, HOBBS! WE'LL FREEZE THE SNOW GOONS RIGHT WHERE THEY SNOOZE! DIE! DIE!

LET OUT MORE HOSE! HA HA! THESE MONSTERS WILL BE POPSICLES THROUGH JULY!

THERE! WE GOT 'EM ALL! I'LL SPRAY A LITTLE EXTRA WATER AROUND JUST TO MAKE SURE EVERYTHING'S ABSOLUTELY FROZEN.

PSSST, CALVIN! YOUR PARENTS' LIGHT IS ON! I THINK YOUR DAD'S COMING!

OH OH! MAH! I SHOULD GET HIM WITH THE HOSE, TOO.

THAT IS CALVIN! HE'S OUTSIDE WITH THE GARDEN HOSE!

IT'S AFTER MIDNIGHT! WHAT DO WE HAVE TO DO, CHAIN HIM IN BED?

CALVIN GET IN HERE! WHAT DO YOU THINK YOU'RE DOING?

WAAAGH! THE WHOLE YARD'S ICE!

OH, HOBBS! DAD'S A SNOW GOON TOO!

DAD, DON'T KILL ME! I CAN EXPLAIN THIS! HELP! HELP!

SNOW GOONS! I FROZE 'EM! THEY WERE GOING TO GET ME, SO I HAD TO GET THEM FIRST! ASK HOBBS!

CALVIN, IT IS AFTER MIDNIGHT BELIEVE ME, WE WILL DISCUSS THIS VERY THOROUGHLY TOMORROW. YOU GET INTO BED THIS INSTANT.

LIKE I'M GOING TO GET ANY SLEEP NOW.

SEE? SEE THE SNOW GOONS? I DIDN'T MAKE THEM! I MEAN, I MADE ONE, SORT OF BY ACCIDENT, BUT THE REST MADE THEMSELVES! THEY WERE BUILDING AN ARMY, SEE?

SEE, THAT'S WHY I HAD TO FROZE THEM LAST NIGHT! I HAD TO GET 'EM WHILE THEY WERE SLEEPING! IT WAS MY ONLY CHANCE, SEE? SEE, IT ALL MAKES SENSE!

THEY NEVER SEE.

WELL, HOBBS, I GUESS THERE'S A MORAL TO ALL THIS.

WHAT'S THAT?

SNOW GOONS ARE BAD NEWS.

THAT LESSON CERTAINLY OUGHT TO BE INAPPLICABLE ELSEWHERE IN LIFE.

I LIKE MAKING THAT DON'T ENCOURAGE BEHAVIOR MODIFICATION.

Far Side by Gary Larson

"Oh, gross!"

Primitive UFOs

"Well, we'll never want for food, Doris. . . . This rock is absolutely encrusted with oysters and mussels — all the way to the top!"

"Well, shoot, I just can't figure it out. I'm movin' over 500 doughnuts a day, but I'm still just barely squakin' by."

In sudden disgust, the three lionesses realized they had killed a tofudbeest — one of the Serengeti's obnoxious health antelopes.

"The carnage out here is terrible, Sandy. . . feathers everywhere you — Oh, here we go! The Animal Control Officer is leading the so-called Chicken Coop Three away at this very moment."

Mister Boffo by Joe Martin

AM I EVE UPDATE

THE KIDS ARE FIGHTING AGAIN

I'VE NEVER WON ANYTHING IN MY LIFE!

I'VE ALWAYS HAD TO WISH FOR IT!

ANOTHER WAY TO TELL WHEN YOU'RE DEALING WITH SOMEONE WHO HAS NO WORD IN HIS VOCABULARY FOR "NEXT"

SNAP

SAY... I THINK I CAN ALMOST FIT MY HEAD IN THAT HOLE.

GEE, CATCHING A MOUSE IS A SNAP.

BAD CHOITH OF WORDTH.

Mother Goose and Grimm by Mike Peters

SEE? I'M A CAT. I DON'T HAVE TO DO ANYTHING THAT A DOG DOES.

MEOW MEOW

I DON'T HAVE TO GUARD THE HOUSE OR SPEAK OR ROLL OVER OR CATCH FRISBEEES OR DO ANY STUPID DOG TRICKS...

MEOW MEOW

"CAUSE I'M A CAT, AND ALL CATS HAVE TO DO IS SLEEP AND EAT..."

MEOW PURRRRR

AND GET DE-CLAWED.

GET DE-CLAWED!

SHE SAID IF I'M A CAT I'VE GOT TO CATCH A MOUSE.

BUMMER.

WHEN A DOG CATCHES A FRISBEE WE JUST LET IT GO... WHAT DO CATS DO WITH A MOUSE WHEN THEY CATCH ONE?

GROSS! I'M GOING TO BE SICK.

ACTUALLY, THEY'RE QUITE GOOD WITH GREY POUPON

SNAP

SAY... I THINK I CAN ALMOST FIT MY HEAD IN THAT HOLE.

GEE, CATCHING A MOUSE IS A SNAP.

BAD CHOITH OF WORDTH.

Notices

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.

Spring Degree Completion

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 into 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.

Middle East support group established

A Support Group, for the ERAU Community who have family and 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, ext. 6035.

Aurora

(continued from page B3) or auroral storm, is created. It is still not known why these particles behave in such a wild and unpredictable manner. The experiment will be studied using an extensive network of cameras and other instruments on the ground and in aircraft scattered across the United States, the Caribbean and South America. The releases will be made over South America between the altitudes of 3000 and 21000 miles.

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,

The spectacle can be viewed from anywhere in the US. It should appear between 10 and 50 degrees above the southern horizon. The lithium release will be visible for about 5 minutes and will appear red. The barium will glow green and purple and will last approximately 15 minutes. Scientists won't decide until 30 minutes before a planned release whether all conditions are favorable to proceed. The public may call 205-544-5356 to learn where the cloud can be seen.

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.

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ACROSS

- Frog
- Tear
- Cerise and carmine
- Unemployed
- Metric measure
- Great Lake
- Jump
- White House nickname
- Baptismal beam
- Tests
- Disc to action
- Female ruff
- Bitar vetch
- Squandered
- More profound
- Moscow
- Garden tool

DOWN

- Expel from country
- Oath
- Brown hiel
- Stalinate
- Paris
- Maddens
- Region
- Wooden pin
- Name for Athens
- Peruse
- Be in debt
- Harad
- Chapeau
- Man's nickname
- Appointment
- Tip
- River in Germany
- Turkish regimer
- Leave
- Lifted

8. Imitate
7. Looked intently
6. Rejet
9. God of love
10. Eat
11. Gels
19. Confederate general
21. Native metal
24. Sinar lump
25. Exit
26. Exhaust
28. Greek letter
29. Vast age
30. Soak, as for
34. Musical instruments
35. Fish eggs
36. Game fish
37. Produced
38. Transia
39. Eileen
42. Sprint
43. Arms box
44. Tidy
46. Lamb's pen name
47. Remanuer
48. Japanese bear
51. Female sheep

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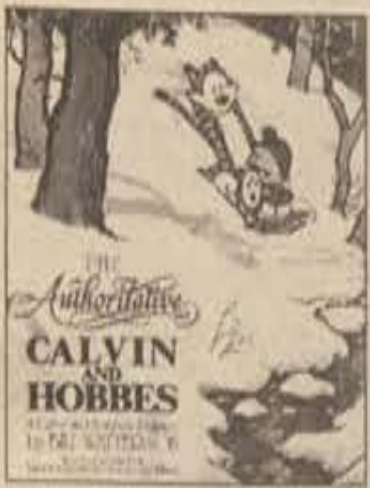
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