An F-16 from the New Mexico Air National Guard arrives at Balad Air Base, Iraq, ANG members from Colorado, Montana, and New Mexico deployed to Balad in late May to support Operation Iraqi Freedom.

Photographers Meet
The fourth annual International Symposium for Aviation Photography, hosted by Nellis ANG in March, was a huge success. Code One sends a special thanks to all the organizers and attendees.

C-130 History Published
The third edition of Herk: Hero of the Skies, regarded as one of the definitive histories of the C-130, was published in December by Blight Mountain Books in Fairview, North Carolina. The new expanded edition brings the history of the Hercules to the present day and includes the story of the rescue of Dr. Jerri Nielsen from Antarctica and development of the C-130J.

F-16 Book Update

Unmanned F-35
Michael McCaffrey plans to fly his own K-35C this spring. This radio-controlled version of the Navy’s F-35 prototype is powered by an alcohol-fueled ducted fan engine. See http://home.att.net/~mrmccaffrey/ px/k35.htm.

Loading A J-DM
Sgts. Lucas Williamson and Justin Smith, both with the 151st Expeditionary Fighter Squadron, load a J-DM precision-guided munition on an F-16 Fighting Falcon at a forward-deployed location in Southwest Asia in mid-January.

Comming Out Of A Herk
Soldiers with Explosive Ordnance Disposal Mobile Unit Eleven (EODMU-11) make a static jump from the ramp of a C-130 Hercules from the 731st Airlift Squadron at Peterson AFB, Colorado, over Oskar Harbor, Washington, on 23 March.

Loading Up
Paratroopers with the Army’s 82nd airborne Division prepare to board a C-130 during Operation All-American Lighting near Al Asad AB, Iraq, last February. All-American Lighting is a joint US Air Force and Army exercise designed to demonstrate military capabilities in a forward-deployed environment.

Subscription Incentive
This quarter we are giving away Operation Iraqi Freedom lithographs signed by the artist Price Fowl to the first twenty new subscribers. A cropped version of the painting was used as a backdrop for the first quarter 2004 edition of the Code One Internet site. For those who want a chance to win one of ten posters without subscribing, send your name, address, and telephone number to Code One/Poster Giveaway, PO Box 748/Mall Zone 1500, Fort Worth, TX 76161. Entries must be received before 1 August 2004.

The Best Of Care
Col. Charles Meyer checks the medical charts of a wounded service member being transported from Iraq to Landstuhl Regional Medical Center in Germany on a C-141 StarLifter. Meyer heads a Critical Care Aeromedical Transport Team, which has special training in managing patients in less-than-ideal patient-care environments. The team consists of Guard and Reserve members assigned to the 731st Expeditionary Aeromedical Squadron, based at Ramstein AFB, Germany.

Power Up
An S-3B Viking pilot gets the signal to increase engine power prior to a catapult launch from the USS Kitty Hawk (CV-63), while the carrier, known as the Battle Cat, is underway in the Pacific Ocean in late February.
Maulers Make Dream Come True

The return of VS-32 to its home at NAS Jacksonville, Florida, on 25 February had special meaning for Christina Brown, a fourteen-year-old girl who is battling neurofibromatosis, a neurological disorder. During its six-month deployment at sea, VS-32, nicknamed the Maulers, raised money for Dreams Come True, a nonprofit organization dedicated to fulfilling the dreams of children with life-threatening illnesses. A fundraiser called the OK Pass Project. For every ceremonial landing judged as "OK Pass," $1 was donated to Dreams Come True. For every "no Graces" landing—that is, below average but safe—$2 was donated. The Maulers raised about $3,000. The money was used to send Brown and her family on a Disney cruise.

Hercules On Display

A Pepe AFB, North Carolina-based C-130E Hercules was retired from active duty on 2 February, with its crew making the aircraft's final flight to the Air Mobility Command Museum at Dover AFB, Delaware. Lt. Col. Jeff Brown, the 2nd Airlift Squadron director of operations, flew the aircraft to the museum. Col. Frank Lanas, the 43rd Airlift Wing vice commander, was the mission commander. Built in 1970, the C-130 will be part of the museum's display honoring the air mobility contribution to the armed forces throughout American history. The Dover museum is the only museum dedicated to the preservation of military airlift and tanker history.

Big Drug Bust

A Royal New Zealand Air Force P-3K Orion crew located two support dumps in the Arabian Sea on 18 December. A patrol aircraft from Australia, United Kingdom, and the United States then tracked the dumps for the next forty-eight hours. With a Royal Air Force Nimrod patrolling overhead, the USS Philippine Sea (CG-58) intercepted the boats on 20 December. Approximately 150 pounds of methamphetamine were found on the first dump. Meanwhile, the second dump attempted to escape. A US Navy P-8A Poseidon crew videotaped that crew throwing approximately 200 bags overboard while they fled. The second dump was caught, and one fifty-pound bag and one thirty-five-pound bag of what is believed to be pure heroin were discovered.
Little Rock Displays RB-57
The 314th Maintenance Squadron, with support from several other units at Little Rock AFB, Arkansas, moved a piece of history 22 March as an RB-57 Canberra was relocated to its new home in Heritage Park. The RB-57 served as a light bomber and reconnaissance aircraft during the Cold War and in Vietnam. Fourteen RB-57 aircraft were assigned to Little Rock in the early 1960s as part of the Arkansas Air National Guard’s 189th Tactical Reconnaissance Squadron.

Taco Leader Retires
Col. William F. Robinson, the vice wing commander of the 150th Fighter Wing of the New Mexico Air National Guard at Kirtland AFB, retired in January after serving thirty-four years in the Air Force. Robinson accumulated more than 7,600 hours in F-4C/D/E, F-15A, A-7D, and F-16C/D fighter aircraft, including more than 113 combat hours in F-4s over Southeast Asia. He also flew F-16 combat sorties in Bosnia and over Iraq in support of operations Northern Watch and Southern Watch. As a fighter pilot and leader for the New Mexico ANG, Robinson accumulated more than 2,200 hours in the F-16.

Hercules Fuselage Fuel Tank Delivered
Aero Union, a supplier of special mission airborne equipment, delivered the first 3,600-gallon fuselage fuel tank system for the C-130 Hercules in early February. The tank system will be installed on a Royal Malaysian Air Force C-130H as part of a transport-to-tanker conversion contract. The 3,600-gallon tank is a cradle-attached system that weighs 2,260 pounds and is used extensively in the KC-130 Hercules tankers operated by the US Marine Corps and several other tactical aircraft operators. Aero Union also produces the C-130 twin 1,800-gallon tank system, which has been in use by the air forces of Australia, Israel, Morocco, and the United States for many years.

New Software Makes Life Easier For F/A-22 Team
The 43rd Fighter Squadron, the Raptor school/house at Tyndall AFB, Florida, will soon be using a new automatic computer software tracking program that checks the progress of F/A-22 students, what stage of training they have completed, and what is scheduled for them next. At the heart of the new system, called the Combat Crew Training Management System, is a room housing two interactive white boards, an active plasma display, a bank of computers, flight scheduler function, and data operator. One of the features of the system is that it automatically notes if a pilot needs to reschedule a flight or a simulation training session.

313 Squadron Celebrates Fifty
The Royal Netherlands Air Force 313 Squadron celebrated its fifty-year anniversary at Twenthe AB in April. More than 600 guests attended a reunion and were entertained by various demonstrations from the base’s fire department, weapons crew, and aircraft static display. The highlight of the afternoon was a flight by the RNLAF F-16 demonstration team, which flew an F-16 with special tiger markings for the occasion.
CHANGING MINDSETS

The F/A-22 assembly line is being transformed as F/A-22 manufacturing ramps up from eleven aircraft in 2003 to ninety in 2005, which will culminate in a total of thirty-two in 2007. "To paraphrase Winston Churchill, we are not at the beginning of the end, but at the end of the beginning," says Terry Loe, the vice president for F/A-22 production and material operations at Marietta.

"Production requires a different mindset from development," Loe continues. "In development, I can tell mechanics I need to change something and they can make it work. In production, we have to develop a process for addressing the change in subsequent and existing aircraft. That process must be both efficient and repetitive. We have to specify every task within the production process in detail. We have to make sure everything comes together at the right time and at the right place."

Increasing the rate can also highlight inefficiencies in any production line, especially one as sophisticated as the F/A-22 line. "We were focused on shaking down the tooling when we were working at lower production rates," notes Mike Packer, the director of F/A-22 manufacturing in Marietta. "We have to standardize the assembly process to improve efficiency. We've pressed over the last year and a half to fill up every position on the line. Maintaining a throughput on a strict cadence reveals obstacles to production."

That throughput for 2004, equates to one F/A-22 rolling out of the factory every 9.6 days. One complete aircraft rolling out makes each job for the entire line roll up one position. Ideally, every position on the entire line moves to this ten-day drumbeat as the drumbeat increases over the coming years, employees have to work smarter. "We have to become more efficient so we can get only so many people to work around the assembly," says Mark McDonald, senior manager of production affordability. "We become more efficient by minimizing design changes and by listening to the mechanics assembling the airplane. Working smarter can mean reorganizing work flows, designing a new tool to simplify a task, or adding a run station on the flight line."

Many of the recent changes are paying off. "We have as much as six weeks waiting to be mat ready," says Charles Biggert, director of major assembly. "Now when a misshipment is shipped from Fort Worth, it arrives just in time for fuselage mate. The overall span time from loading the first bulkhead to moving out the door was sixteen months for Ship 29, which was rolled out of final assembly in 2004. That goes down to one year for Ship 5, which will be delivered to the flight line in 2005. So, the span goes down significantly in the coming year."

FLARING TOLERANCES

F/A-22 assembly takes place in the southwest corner of the large B-1 manufacturing building in Marietta. B-1 encompasses 3.5 million square feet, of which the Raptor assembly area occupies 240,000 square feet. The F/A-22 production area is physically divided into two parallel lines, forward fuselage assembly and final assembly. The overall production tasks assigned to Marietta can be traced back to the original three-company teaming agreement for the Advanced Tactical Fighter. That agreement cut the aircraft into sections, with Boeing building the wings and afd section in Seattle, Washington; General Dynamics (now Lockheed Martin Aeronautics Company) in Fort Worth building the midsection; and Lockheed (now also Lockheed Martin Aeronautics Company) building the forward fuselage, performing final assembly, and conducting flight tests in Marietta.

Both the forward fuselage and final assembly lines have split-level stations. Upper and lower decks allow crews of mechanics to work above and below assemblies simultaneously. Supplemental lighting, reflected by shiny white epoxy-painted floors, keeps the work area well illuminated. The line is relatively quiet thanks to a recently installed utility tunnel that brings power, compressed air, water, and hydraulic fluid to the line. Assemblies move from one station to the next on rail systems for much of the line. Workers use laser theodolites and mechanical alignment tools at various locations to verify tolerances measured to one-thousandths of an inch in some cases.

"Interchangeability drives a lot of our tolerance requirements," explains David Trawinski, director of production engineering for F/A-22. "Maintainers in the field have to be able to replace one panel with another panel and not worry about trimming the new panel to fit. Low-observable requirements drive some of these tolerances as well." Trawinski is in charge of making rapid interchange changes on the production line. "I deal with discrepancies on the line," he says. "For example, if someone trims a part too much, say by thirty-thousandths of an inch, we have to fly a sheet and we have a disposition part quickly to keep the line moving. We also take immediate corrective actions so we don't repeat mistakes."
Engineering support centers located next to the production line minimize the time needed to disposition the discrepancies and take corrective actions. The centers, called waffle houses because their picture windows and rectangular shape resemble local restaurants of the same name, were put in about two years ago to get support functions as close to the line as possible.

"Engineering, quality assurance, and material support are within an arm's reach of the mechanics," Trawinski adds. "As the line matures, we replace engineers with more direct floor support personnel."

Portable computer terminals scattered throughout the production line provide updated drawings as well as digital work instructions. Mechanics can pull up the latest detailed drawings and assembly instructions with step-by-step illustrations. "Space limitations don't allow us to go up into a tank to show someone how to do a job," notes Steve Asley, a supervisor on the final assembly line. "So, we use work instructions with photographs that show fastener installations, drill-outs, pressure checks, sealant applications, and tube installations. Quite a bit of work goes on inside a fuel tank, so these instructions must be very detailed."

**Val Retires**

The UP-3A utility aircraft at NAS Keflavik, Iceland, nicknamed "Val," was used for nearly twenty years to carry more than 22,000 personnel to more than fifteen countries while accumulating just over 10,000 mishap-free flight hours including 5,675 landings. The UP-3A was retired on 26 January to the Aerospace Maintenance and Regeneration Center at Davis-Monthan AFB, Arizona. Before being stationed at Keflavik, the aircraft had been assigned to VP-30, VP-8, VXN-8, VP-91, and the Naval Aeronautical Support Center in Miami, Florida, from all of its various assignments, the aircraft accumulated 20,108 mishap-free flight hours and was flown more than seven million miles.

**Safe Flying**

The USAF F-16 fleet recorded its safest flying year in history during the 2003 calendar year with a rate of 1.97 aircraft lost per 100,000 flight hours. The USAF F-16 fleet consists of more than 1,200 aircraft that were flown for 355,000 hours during the year. The F-16 continues to be the best safety record in Air Force history for both multirole and single-engine fighter categories. Last year, the worldwide F-16 fleet surpassed 11 million flight hours, and the cumulative mishap rates continue to improve as refinements are made to aircraft systems and to operating and maintenance procedures.

**S-3 SLAM-ER Shot**

While detached to NAS Fallon, Nevada, earlier this year, S-3 and F/A-18 crews from VS-32 and VFA-82 aboard the USS Enterprise (CVN-65) cooperated for the first AGM-84K Standoff Land-Attack Missile-Expanded Response missile firing using airborne retargeting to strike a target that had not been preplanned on 6 May. All retargeting information was received in flight via datalink. This shot marked the first SLAM-ER live fire event controlled by a fleet S-3B. The target was a simulated surface-to-air missile radar site hosted on the Naval Air Warfare Center Weapons Division Sea Target Range off the California coast.

**Red Tail F-16**

The 187th Fighter Wing at Dannelly Air National Guard Base in Montgomery, Alabama, paid tribute to the Tuskegee Airmen by painting one of its F-16s in the same color scheme as the original Tuskegee Airmen aircraft. The unit hosted three of the original Tuskegee Airmen in April as part of a Guard diversity program. The group included Gen. Daniel "Chappie" James, Jr., who was a member of the original Tuskegee Airmen class.
F-117 Pilots Reach 1,000 Hours

Two pilots both reached 1,000 flying hours in the F-117A, when they landed at Holloman AFB, New Mexico, on 29 March. Lt. Col. Frank Regins, operations director for Detachment 1, 53rd Test and Evaluation Group, and Maj. John Markle, assistant operations director for the 37th Combat Training Squadron, were the fourteenth and fifteenth Night Hawk pilots to reach this milestone. Lt. Col. Thomas Sherrill, the 417th Weapons Squadron commander, became the sixteenth Night Hawk pilot to join the 1,000-hour club on 27 April at Holloman. Roughly 500 pilots have flown the F-117A, but few reach the thousand-hour mark because they normally serve only one three-year operational tour.

New Boss For DC Guard Wing

When Col. Linda McGuire assumed command of the 113th Wing, the Washington, DC, Air National Guard unit, on 1 December, she became the first woman to command an ANG wing, and is believed to be the first woman to command an Air Force fighter squadron. McGuire began as an operational support airlift pilot in 1988 before serving as a squadron commander. She was also the first woman to command an ANG flying squadron. Approximately 1,050 people are assigned to the 113th Wing, which includes the 121st Fighter Squadron, an F-16 unit, and the 221st Airlift Squadron, which flies congressmen and other dignitaries around the world in a fleet of C-38 and C-40 operational support aircraft.

Promotion At Altitude

Skyler Hester had a big day on 15 January. The F-16 pilot from the 510th Expeditionary Fighter Squadron began the day as a first lieutenant, bombed a target in Iraq, and was sworn in as a captain while flying at more than 600 miles per hour. After landing and taxiing to his parking spot, Lt. Col. Michael Fehlin, 510th EFS commander,acked Captain Hester’s rank on his flight suit and congratulated him.

Celebrating Centennial Of Flight

Beginning Forward Fuselage

The forward fuselage of the Raptor takes shape on the left half of the U-shaped production line, beginning with the wheel well and forward fuel tank assembly in Station 8200 and ending with forward fuselage functional checks in Station 6000. The entire process takes about 100 workdays.

The forward fuselage begins as two separate structures, the wheel well/fuel tank assembly and the forward structure that will eventually contain the cockpit.

The forward structure is built up on two stations of a short, perpendicular feeder line. It is then slid on tracks onto a turntable that pivots ninety degrees to line it up parallel with the wheel well/fuel tank assembly. The sections are mated in Station 8000, holes for access doors, panels, and skins are drilled in the mate fixture before the forward fuselage assembly is moved down the rest of the line as a single unit.

The forward fuselage is loaded in the “retainer” and rotated to remove any foreign objects left over from the assembly process. The move to the final assembly line is the last done by overhead crane. Crane moves are kept to a minimum to ensure the structural integrity of the assembly.

Lt. Col. Dave Race, the commander of the 422nd Test and Evaluation Squadron at Nellis AFB, Nevada, flew an F/A-22 Raptor during a First Flight Centennial Celebration flyby at the Wright Brothers National Memorial near Kitty Hawk, North Carolina, on 16 December, the day before the actual 100th anniversary of the Wright Brothers’ epic flight. Maj. Robert Garland flew an F-15 Eagle from Langley AFB, Virginia, and joined in formation after Race’s flyby. The 27th Fighter Squadron at Langley is slated to be the home of the first operational Raptor squadron and is scheduled to receive its first aircraft late this year.
The majority of the drilling and fastening is complete when the assembly reaches the fourth position in Station 5000. The remaining work consists of sealing and pressure testing fuel tanks. The final operations involve completing the remaining functional tests for the environmental control system and cleaning the entire assembly and inspecting it for foreign object debris, or FOD.

"Many of the 300 or so mechanics we have on the final assembly line came from commercial airlines," Anley says. "We have a lot of mechanics from Delta, United, and Northwest. Most of them have excellent mechanical backgrounds. Airline mechanics are more familiar with the tolerances than someone who, say, came from a sheet metal shop. They have an understanding of blueprints, metal work, the tools involved, and the terminologies we use. We're also seeing more experience with composite materials from commercial airline mechanics. All of this experience simplifies training."

Jerry Worley is one of the veteran mechanics on the line. He has worked on the C-141, C-5, and C-130 since coming to Lockheed Marietta in 1983. He worked on the L-1011, B-1 bomber, and the Space Shuttle in California before that. "I've been everywhere in the Marietta facility from the flight line to final assembly," he says. "The F/A-22 is the most different and difficult aircraft I have ever worked on. That's what makes it so much fun. I don't come in every day and drill the same old holes. The job is never boring."

"The various materials, the alloys and composites, keep the work interesting," Worley continues. "The airplane doesn't have flat areas. Every surface is angled or contoured. That affects the drilling process. The working spaces are very compact. We have to be careful with fiber optic lines. Every operation is precise. We can't tolerate one sloppy hole on that aircraft."

Raptor mechanics take a personal role in making production schedules and achieving quality goals. They track their own work on large charts next to the production line, signing off specific tasks as they are completed. Locations of toolboxes and drill motors are the result of employee suggestions. Mechanics have input into jig designs and tooling setups. Even toolbox arrangements are based on requirements developed by mechanics.

We Have Control

A P-3C crew from the Naval Air Warfare Center Aircraft Division launched, took control of, and recovered a Fire Scout, Vertical takeoff unmanned aerial vehicle for the first time during a forty-five minute technical demonstration at NAS Patuxent River, Maryland on 19 December. The P-3 crew fully controlled the UAV and its sensors, and vectored the Fire Scout to a simulated target where it fed streaming video back. The Orion then relayed the mission video from the Fire Scout, along with video gathered from its own onboard electro-optical sensor, to a ground station. This broadcast of sensor data from a UAV to a ground station demonstrated a key network-centric communications concept.

Iron Earthquake Relief

US service members began delivering humanitarian aid to Iran in the wake of a late-December earthquake that left an estimated 25,000 Iranians dead in the city of Bam. Shortly afterward, the US military began deploying more than $50,000 pounds of medical supplies. These were the first US aircraft to land in Iran since the end of the Iranian hostage crisis in 1981. At least seven C-130 Hercules flights went from Kuwait to Kerman, the Iranian provincial capital near the affected areas. In addition, a C-5 Galaxy crew from Dover AFB, Delaware, and a C-17 crew from Charleston AFB, South Carolina, delivered personnel, rescue teams, and equipment to Kerman.

Operation Nile Assist

After a cyclone devastated the South Pacific island of Niue in early January, the Royal Australian Air Force delivered more than 25,000 pounds of emergency medical supplies, Army vehicles, generators, tents, and all equipment necessary for maintaining a self-sufficient field hospital on board one of the service's twelve C-130s as the first stop of Operation Nile Assist, an Australian-led humanitarian operation. A contingent of twenty-one Army and RAAF personnel also flew in on the Super Hercules to set up the field hospital and assist the islanders.

Night Riders Deactivated

Shortly after midnight on 4 April, Lt. Col. Don Gresham, 336th Operations Group chief of special capabilities at Dover AFB, Delaware, brought the C-5 Special Operations Low Level II mission to a close after twenty years. The C-5 special operations crew specialized in clandestine operations with night vision goggles. Some of these SOLL II missions included heavily equipped and personnel aircraft and hot refueling of helicopters in forward locations. Although many missions remain secret, the C-5 SOLL II crews contributed to operations in the Philippines, Desert Shield/Storm, Enforcing Freedom, and Iraq Freedom. The SOLL II mission equipped with the C-141 and will now be taken over by C-17 crews.
27th Fighter Wing Wins Colombian Trophy

The 27th Fighter Wing at Vance AFB, New Mexico, was recently announced as the recipient of the Colombian Trophy for best fighter safety achievement in the US Air Force for 2003. This is the fourth consecutive year that an F-16 unit has won the prestigious award, and marks the eighth time in the past thirteen years a Fighting Falcon unit has claimed the trophy. The 27th FW flies a variety of F-16s—Air Force Block 30/40/50 and a training squadron of Singepe Block 52 aircraft.

Moroccan Earthquake Relief

After a magnitude 6.4 earthquake struck the Al Hoceima Province in northwestern Morocco on 1 February, a large international relief effort quickly began. The United States joined the relief effort on 28 February when a C-130H crew assigned to the 37th Airlift Squadron at Ramstein AB, Germany, touched down at Nador Airport with four pallets of critical medical supplies and a US European Command Humanitarian Assistance Survey Team. Several hours later, a Utah Air National Guard C-130 crew arrived with a full load of blankets and additional medical supplies. The Guard’s involvement is based on a new program that aligns US allies with a particular state, known as the State Partnership Program.

Injured Afghan Children Airlifted

Eighteen Afghans were carried on an emergency airlift mission to an American military facility after two improvised explosive devices detonated on 6 January. More than forty-five Afghans were killed or injured in the explosions. Coalition forces used US Air Force HC-130 aircraft on alert from Kandahar Air Base in Afghanistan to transport the most severely injured from the medical facilities at the coalition air base at Kandahar to a field hospital in Bagram for advanced life-support care. Twelve of the evacuees were children. The lifesaving flights were the result of coordination between Combined Joint Task Force-180 forces at Kandahar and Bagram, and the Combined Air Operations Center in Kuwait.

Air Mobility Brings Forces to Haiti

President George W. Bush ordered US Marines into the Republic of Haiti on 26 February. The Marines were the lead element of a multinational peacekeeping force sanctioned by the United Nations after former Haitian President Jean-Bertrand Aristide left office. Active and reserve crews flying C-5s, C-141s, and other Air Mobility Command aircraft initially delivered more than 3,000 Marines into Haiti’s capital of Port-au-Prince. As of 5 March, more than 1,200 short tons of cargo had been delivered on thirty-seven missions. The US Coast Guard later supported the Haiti operation by taking a seaport security team and its supplies into Port-au-Prince on board one of its new HC-130 transports.

END: FINAL ASSEMBLY

From the last position in the body mate station, the 10A-22 rises tailfirst and wingless with the help of an overhead crane. The incomplete Raptor, clad in patchwork shades of primer yellow, green, and tan, lands a few yards away on a fixture called a tri-dolly, a one-piece movable fixture that attaches to the fuselage at three points. The next time the aircraft leaves the ground, it will be propelled by a pair of Pratt & Whitney F119 engines. The Raptor is now about seven positions and fewer than 100 workdays away from rolling out of the factory.

Any visitor to the Raptor production line, and to the final assembly area in particular, will leave with an increased sensitivity to FOD. Twenty minutes before the end of every shift, mechanics and management crawl on the jet on their hands and knees searching for FOD with mirrors and flashlights. Others sweep and vacuum the work spaces. Areas designated FOD-critical require those entering to abide by a FOD dress code—no jewelry and nothing but clothing allowed above the waist.

Loran Bodnar manages the first five positions of the final assembly area (Positions 8 through 4). “I practically live on the floor trying to make that mechanic’s life a little easier. I’m getting the right people out there to answer his questions. We keep busy every day improving the quality of the jet and its assembly process.”

The Raptor spends most of its time in Bodnar’s domain getting all of its flight control surfaces installed and working. The landing gear is the first major component installed after body mate. The wings and vertical stabilizers go on next. They are followed by the horizontal stabilizers, and control surface edges. The ailerons, flaperons, and rudders complete the installation of the control surfaces.

“We install the surfaces and route the hydraulics to them,” says Bodnar, who brought his F-16 production experience to Marietta a few years ago. “We complete all the hydraulic system connections that have to be made after body mate,” he explains. “We swing the gears for the first time. The aircraft leaves Position 6 on its own landing gear.” Pre-power tests are started in Position 5, where the inlets, aft boom edge, wingtip edge, wing stub edge, and the leading edge flaps are installed. In Position 4, the inlet and diverter lip edges, antennas, and main and side weapon bay doors are installed. At this point, all the actuators and hydraulics are working and the jet has full electrical power.

The Pratt & Whitney F119 engines and the Northrop Grumman AN/APG-77 radar are installed in Position 3. “We get very heavy into functional testing in Position 2,” notes Scott Ends, who manages the final three positions on the line. “We install all of the avionics. We load software. We test each system individually. We turn everything on. We fire everything up from the radar to the electronic warfare system—all at the same time. We play war games.

TOP PHOTO BY JOHN CORBIN; POPULAR SCIENCE. BOTTOM PHOTO BY JOHN B

38 Cycle One

Second Quarter 2004 7
with the airplane on the assembly line. We make sure that everything is good to go."

Once the system checks are complete, open panels are closed before the Raptor moves to the final assembly position. Most of the compartments, which will not be opened again before the airplane is delivered, require an okay from a government inspector before the panel is installed. The canopy and radome are the last major components installed before the Raptor rolls off the assembly line. The ACES III ejection seat is the very last major component, and it is installed on the flight line.

The last position is dedicated to the inspection process. "Quality assurance teams are involved throughout the assembly process," notes Janet Nash, director of quality for the F/A-22. "A government acceptance team in Marietta also participates in inspections throughout the final assembly line and on the flight line. Air Combat Command has a full-time staff here. All of these inspectors are checking holes, measuring locations, and checking paint thickness and surface finishes. Many of these inspection items were established as part of the design process. The lists have been refined as we gain experience with production."

Once company inspectors have scrutinized the aircraft in Position 1, the Raptor is officially released to a team of government inspectors. "Ten to fifteen government inspectors crawl all over the airplane," notes Nash. "They write up everything they find. Our goal is for them to find nothing wrong with the airplane. We average only ten to twenty write-ups per aircraft and nearly all of these are relatively minor. We've never had an airplane rejected. Fixing all the write-ups for a given aircraft has never required more than two hours."

More F-2 Components In Work
Mitsubishi Heavy Industries awarded Lockheed Martin a contract valued at more than $130 million on 31 March to manufacture components for six additional F-2 production aircraft. MHI is the prime contractor for the F-2, Japan's long-range, highly maneuverable support fighter. This new award brings the total aircraft under contract to seventy-one. The company will continue to provide all of the aft fuselages, wing leading edge flaps, and stores management systems, eighty percent of all left-hand wing boxes, and other avionics and avionics support equipment. Lockheed Martin components are shipped to MHI's Komaki-South facility in Nagoya, Japan, where they are assembled by MHI with other components to form the F-2.

I Can See You
Paul Boulouga, chief engineer of Advanced Development Projects at Lockheed Martin Aeronautics Company, has received Design News magazine's Engineer of the Year award, the publication's highest honor. Boulouga, who received the award in late February, invented the shaft-driven lift fan and showed how it could be used to design a family of short takeoff/vertical landing and conventional variants of the same aircraft. The counter-rotating fan, mounted horizontally behind the cockpit of the F-35, works automatically with a reengage rear engine nozzle to produce unprecedented lifting force during short takeoffs, vertical landings, and hover. Rolls-Royce, under contract to Pratt & Whitney, is developing the lift fan for all future STOVL F-35s.

Design News Award Goes To Lift Fan Inventor
The F/A-22 recently became the first aircraft to be tested behind a specially modified KC-135 tanker to see how the Raptor performs in rain and ice conditions. The rain and ice tanker at Edwards AFB, California, is fitted with a device similar to a shower head to create a saturated cloud, which results in varying consistencies of rain and ice. Ice tests, like those performed with the Raptor, are conducted by flying test aircraft at freezing temperatures. This approach allows the water from the tanker to freeze only when it contacts the aircraft. The effect of the ice on the performance of the F/A-22 was negligible.

Icing The Raptor

The F-35 Joint Strike Fighter team successfully launched the first phase of the F-35 Electro-Optical Distributed Aperture System early risk-reduction flight test program recently at the Naval Air Warfare Center's Aircraft Division at NAS Patuxent River, Maryland. The next-generation EDAS, developed by a Northrop Grumman Electronic Systems-led team, provides the F-35 with key capabilities that include missile warning, navigation forward-looking infrared, and infrared search and track capability. The flight test program uses a BAC 1-11 flying test bed and captures data using prototype versions of the F-35 DAS sensors. DAS sensors also will be flown in a centerline pod on an F-35 to record data in a dynamic fighter environment.

The F-35 Joint Strike Fighter team successfully launched the first phase of the F-35 Electro-Optical Distributed Aperture System early risk-reduction flight test program recently at the Naval Air Warfare Center's Aircraft Division at NAS Patuxent River, Maryland. The next-generation EDAS, developed by a Northrop Grumman Electronic Systems-led team, provides the F-35 with key capabilities that include missile warning, navigation forward-looking infrared, and infrared search and track capability. The flight test program uses a BAC 1-11 flying test bed and captures data using prototype versions of the F-35 DAS sensors. DAS sensors also will be flown in a centerline pod on an F-35 to record data in a dynamic fighter environment.
AMPing Up

The US Air Force authorized Lockheed Martin in January to begin installing the first eight C-5 Haven Modernization Program kits and also purchased the eighteen additional kits that will make up Lot 2. Installation of the Lot 1 kits is scheduled to begin in June. Once production starts, it will take approximately two months to modify each aircraft. Fleetwide AMP installation in the 132 C-5s is expected to be complete in 2007. AMP replaces the analog cockpit instruments and systems in the C-5 with digital displays and equipment and also provides the necessary communications and navigational avionics to comply with the new Global Air Traffic Management requirements.

Airmen Return From Deep Freeze

The last C-141 StarLifter crew from the 445th Airlift Wing at Wright-Patterson AFB, Ohio, returned from Christchurch, New Zealand, on 4 March after completing its yearly role in Operation Deep Freeze, the resupply of National Science Foundation research stations in Antarctica. The wing, along with its sister C-141 unit, the 452nd Air Mobility Wing at March AFB, California, carried 1.6 million pounds of cargo to and from McMurdo Station, Antarctica. The aircraft flew 3,446 passengers and logged more than 426 flying hours. This year, C-141 crews flew nineteen times to Antarctica for the resupply phase and twenty-two times for the season-ending redeployment phase.

Exercise Air Brake 04

An Italian Air Force F-16 pilot intercepts a US Navy F-3C from VP-26 during Exercise Air Brake 04, a multinational aviation interdiction training exercise over the Mediterranean Sea. The exercise, led by Italy, is part of the Proliferation Security Initiative, a collaborative effort to take active measures against trafficking in weapons of mass destruction. The F-3C plane and crew participated in the exercise along with Italian assets to improve interdiction capabilities and interoperability among the sixteen PSI nations. VP-26 was deployed to NAS Sigonella, Sicily, in support of Commander Task Force 67, Sixth Fleet, and European Command operations at the time of the exercise.

First Falcon STAR F-16 Delivered

Maintainers at the Ogden Air Logistics Complex at Hill AFB, Utah, recently handed off the first F-16 to undergo an upgrade that promises to make the fleet operational beyond 2020. The revamped F-16, modeled on the 149th Fighter Wing, Minnesota Air National Guard, is part of the Structural Augmentation Road Map program, or Falcon STAR. The Falcon STAR program involves modifying thirteen different structural components, including wing fittings, and improving aircraft interiors. Falcon STAR modifications are applied to existing aircraft and added to all new F-16s to compensate for aircraft stress caused by increased usage rates and heavier gross weights. Once modified, the aircraft will meet its designated service life of 8,000 flight hours.

TO THE FLIGHT LINE

Newly minted Raptors are towed out of the factory to the south side of Lockheed Martin facilities in Marietta. A yellow line marks most of the route, which cuts across Dobbins AFB. The first stop is a fuel tank flushing facility. The fuel system is flushed ten to twenty times with JP-4 through a range of filters, from coarse to fine. “The process once required more than 100 flushes to get a fuel system completely clean,” says Nash. “We managed to reduce that to about thirty flushes by changing the cleaning process for the fuel tanks here on the assembly line. We implemented those same procedures for fuel tanks assembled in Fort Worth and Seattle.” Once the fuel system is deemed spotless, the Raptor is loaded with fresh fuel and towed to an engine run station. The aircraft is tied down and the engines are cycled for roughly an hour from idle through afterburner. The auxiliary power unit is tested here as well. The Raptor is now ready to fly.

The airplane is then handed over to a government test pilot for two or three more flight tests with profiles similar to those flown by company test pilots. Once these tests are passed, the government formally accepts the airplane. An Air Force pilot from the receiving base flies the Raptor to its new home.

CUSTOMER CONFIDENCE

The current production run for the F/A-22 is somewhere between 250 and 300 aircraft, depending on the recent cost overruns. “We can affect our own destiny on the overall production number,” says Mike Packer. “We help the cause by being more efficient and producing higher-quality aircraft at lower cost.” Seventy percent of the material, parts, and components come from outside Lockheed Martin, so Packer and his team can generate only a certain amount of savings directly. “But we can identify a lot more by virtue of being the prime contractor,” he says. “Suppliers have to gear up their production to support our 9.6-day move rate well. We are also looking at multiyear procurement approaches that afford suppliers more stability, which in turn lowers prices.”

Aside from economic considerations, the Air Force continues to express its confidence in the program. “From the secretary of the Air Force, the chief of staff, and the general officers who are accepting the hardware down to the pilots and maintainers who are using the hardware, all are communicating their satisfaction to us and to our supply base,” Packer says. “This builds confidence in the program.”

“Every time a Raptor rolls out the door, word comes down the line,” says Worley. “Seeing a new one fly for the first time still attracts a crowd. Every time I see a tall number in a photograph, I recall working on that particular aircraft. People care about the program and we all want to do a good job.”

Eric Huls is the editor of Code One.

Second Quarter 2004

The Republic of Korea awarded Korea Aerospace Industries a production contract for twenty-five T-50 Golden Eagle supersonic advanced jet trainers in mid-December. The contract covers the aircraft, alternate mission equipment, integrated logistics support elements, and production start-up costs. The aircraft will be built at KAI’s aircraft production facilities at Sacheon, South Korea, where it is currently being tested. The first production T-50 will be delivered in late 2006. Korea Aerospace Industries is the prime contractor for the T-50 full-scale development program, with Lockheed Martin as the principal subcontractor. The Republic of Korea Air Force is conducting the flight testing. The T-50 new will transition from the only supersonic trainer in development to the only one in production.

The US Coast Guard has been busy with its new HC-130J, testing an MH-68A helicopter from the west coast, where it had been used in a drug interdiction, back to its home station in Jacksonville, Florida. In May, another MH-68 was flown from Jacksonville to the west coast. The unit also transported the members of Coast Guard Port Security Unit 308 on the final leg home after being deployed in Kuwait for seven months. The HC-130J crew, based at CGAS Elizabeth City, North Carolina, flew the team from NASA Norfolk, Virginia, to Gulfport, Mississippi, on 11 March. While deployed to the port of Ash Shuwaikh, Kuwait, PSN 308 ensured the safe flow of equipment and supplies to coalition forces participating in Operation Iraqi Freedom.

The European Participating Air Forces—Belgium, Denmark, Netherlands, Norway, and Portugal—completed operational testing of the M3 upgrade to their F-16 aircraft last March. The testing was conducted from Orland AB, Norway. Eight lead-the-fleet modified aircraft were flown on 268 sorties, an average of more than twelve sorties per day. Approximately thirty percent of the missions were flown at night. The M3 upgrade is a hardware and software follow-on to EAPF’s F-16 Mid-Life Update. Enhancements include Link-16 datalink, helmet-mounted cueing systems, and laser-aidedmunitions, such as the latest GPS-guided precision weapons.

Italian Premier Visits Iraq

Italian Premier Silvio Berlusconi paid a surprise visit to troops at a military base in southern Iraq on 10 April, posing for photos and joining the troops for lunch. The premier traveled in a C-130I flown by a crew from the 46th Air Brigade at Pisa; the visit was conducted in secrecy and under tight security. Some 2,900 Italian armed forces members are based in Nasiriyah, helping reconstruct that city.
Raptors Sharpen Talons

The F/A-22 Raptor test fleet at Edwards AFB, California, recently completed several important weapons tests. On 30 January, three missiles were launched within seconds of one another from two different aircraft. An AIM-9 was launched with the aircraft traveling at Mach 1.2, an altitude of 5,000 feet, with a 100-degree-per-second roll rate. In another part of the sky, two guided AIM-120 shots were completed by two pilots using the Raptor’s infrared data link. The shots came while the aircraft were at Mach 1.3 at 30,000 feet looking down at the targets.

T-50 Testing Continues

Flight testing of the T-50 Golden Eagle supersonic trainer continues to go well, as air start flight testing of the F/A-22 RAP/102 jet engine and external stores testing recently began. Flight testing with captive AIM-9 air-to-air missiles was initiated last year, and the first flight with external fuel tanks occurred on 7 February. These initial flights are to verify the T-50 aircraft’s stability and control, flutter, and handling qualities with stores. Later flights will verify its performance, stores functionality and interfaces, and stores separation. Air start testing involves intentionally shutting down the engine in flight and restarting it. The initial tests are designed to verify the air start envelope and procedures.

2003 Semper Viper Award

Maj. Edward Linch and Capt. Brian Wolf are the winners of the 2003 Joe Bill Dryden, Semper Viper Award. The two Block 30 F-16 pilots won the award for their distinguished service during a mission over western Iraq during Operation Iraqi Freedom. Linch commanded a two-ship sortie supporting a search-and-rescue mission during a 24-hour vulnerability period. While en route, the pair received urgent calls on the emergency radio frequency from a coalition special forces team that was surrounded by a numerically superior enemy force only 300 meters away and closing. The pilots descended through hazardous weather conditions at night with low ceilings, poor visibility, and limited illumination to provide immediate air support for the trapped team. They used a combination of jet, smoke, and bombing to gain time for the special forces troops to abandon their vehicles, break through the line of enemy troops, and escape toward a safe extraction point. Linch and Wolf are members of the 57th Wing “Fighting Tiger” of the Alabama Air National Guard based at Dannelly Field in Montgomery.

NATO F-16s Based in Lithuania

Shortly after Lithuania joined NATO on 29 March, a detachment of four Belgian F-16s and two Lithuanian F-16s on a long-term basis and represents the eastward NATO presence in Europe and the closest to the Russian border. Lithuania, formerly a part of the Soviet Union, is one of seven new member countries to join NATO.

A military airlifter, the C-222, first flown in 1973, has always had a rugged design. Despite its ninety-four-foot wingspan and seventy-five-foot length, the C-222C-27 has an airframe that can accommodate up to three 22s flight. A total of 100 C-222s were built, including ten for the US Air Force, which operated them as C-27As at Howard AFB, Panama, in the early 1990s.

"The C-222 was underpowered and had some high altitude, long airframe limitations that were evident in Panama," says Gary Yack, Lockheed Martin C-27J program manager. "Since the airframe was sound, we concentrated on propulsion and avionics in developing the C-27J.

One original design concept was to use the quick engine change installation from the C-130J on the C-27J. But that would have been a significant structural modification requiring the Spartan airframe to be retrofitted. The C-222's existing, well-engineered design has instead modified the airframe to accommodate the 6,000 shaft horsepower (shp) Rolls-Royce AE2100D3 engine and its avionics modifications, which include a new avionics suite, a new propulsion system, and a new airframe.

"We determined early in the process that developing a less capable avionics suite from scratch for the C-27J would require more time than retuning the integrated avionics from the C-130J," notes Yack. "Software development for the C-27J has been a real high-light of the program. We located our software engineers and avionics engineers right beside the Systems Integration Laboratory rather than separate them. That collocated team became a vital link in establishing a virtual work environment with engineers in Italy."

Only eighteen months after program go-ahead, Gianluca Evangelisti, Alenia's chief test pilot for transport aircraft and test pilot Antonino Frediani flew the C-27J propulsion prototype for the first time on schedule on 21 September 1999, from Alenia's flight test facility at Castel, Italy, near Turin. The second flight test aircraft—the first manufactured to the full production configuration and the first to have the advanced cockpit and avionics suite—was flown on 12 May 2000. A third full-up C-27J, an existing aircraft that was retrofitted with the new propulsion and avionics, joined the test fleet on 8 September 2000.

"We had a fully certified aircraft in short order," Yack recalls. "With the US FAA certification of the propulsion system and avionics complete,
Aid To Chadian Forces

Two crews from the 377th Air Refueling Squadron at Ramstein AB, Germany, delivered nineteen tons of aid to Chad on 12 March in response to a request for assistance after Chadian military forces engaged a group of transnational terrorists and sustained casualties. Three Chadian soldiers were killed and sixteen were injured in the skirmish. The Ramstein crews were airborne only an hour after receiving the call. A little more than ten hours after takeoff, the crews landed on a 7,700-foot runway just outside of Faya-Largeau, and combat offloaded nine pallets of food, blankets, and medical supplies.

Tyndall Trains First F/A-22 Pilot

Maj. Michael Hoepner recently became the first Tyndall-based pilot to complete his F/A-22 fighter training at Tyndall Air Force Base, Florida. The assistant director of operations for the 43rd Fighter Squadron, Hoepner is one of only a handful of Tyndall fighter pilots currently qualified to fly the F/A-22 and the first pilot to qualify in a Tyndall-stationed F-16C. Lt. Col. Jeffrey Heming, 43rd Fighter Squadron commander, and Maj. Stover Lucanzki, a 43rd FS flight commander, both completed their training at Nellis AFB, Nevada. After the core cadre of seven pilots at Tyndall gets qualified by early spring, three other F-15 pilots are scheduled to arrive at the 43rd for F/A-22 training.

New F-16s For Israel

The F-16I, an Advanced Block 52 F-16 variant built for Israel, was flown for the first time on 23 December 2003. The Peace-Marriage V foreign military sales program will supply the Israel Air Force with 102 two-seat aircraft and is the largest Israel F-16 acquisition yet. The F-16I is specially designed for Israel and has been nicknamed Soufia, the Hebrew word for storm, by the IAF. Deliveries are scheduled through 2008.

Fighting Falcon Birthdays

The thirty-fifth anniversary of the first flight of the F-16 prototype was celebrated on 2 February. Company pilot Phil Destricher completed the first official flight of the YF-16 on 2 Feb 1974 from Edwards AFB, California. Destricher had already inadvertently flown the revolutionary aircraft two weeks earlier—Flight 0—when he elected to take the aircraft airborne after experiencing control anomalies during a high-speed taxi test. The USAF Force celebrated twenty-five years of F-16 operations at Hill AFB, Utah, in January. The first F-16A was assigned to an operational unit, the 388th Tactical Fighter Wing, arrived in January 1979. The wing was the first training unit and the first wing to become operational with the new fighter.
EVENTS

Assignment: Iraq

The first F-16 Fighting Falcon pilot from the 127th Wing at Selfridge ANGB, Michigan, arrived at his new base at Kirkuk AB, Iraq, on 1 March. F-16s are replacing A-10 Thunderbolt II aircraft of the 354th Expeditionary Fighter Squadron from Davis-Monthan AFB, Arizona. The base at Kirkuk is now home to the first operational squadron of F-16s based in Iraq.

JASDF Humanitarian Mission Into Iraq

The Japan Air Self-Defense Force flew its first humanitarian mission into Iraq as part of coalition air forces, landing at Talil AB on 3 March. While the Self-Defense Forces have previously conducted humanitarian deployments to other locations in the world, this is the first time Japanese airmen have deployed to a conflict zone since the end of World War II. Flying from an undisclosed air base in Southwest Asia, the Japanese C-130 crew carried 5,000 pounds of supplies for the local people. Once at Talil, US and Japanese airmen took the cargo from the C-130 and loaded it aboard Japanese Ground Self-Defense Force trucks. The ground forces distributed the humanitarian supplies within Iraq.

Air Strike Targets

Two F-16S from the 510th Expeditionary Fighter Squadron dropped two Joint Direct Attack Munitions on an enemy safe house near Ar Ramadi, Iraq, on 27 December. Operation Stocking Stuffer was launched to destroy an abandoned two-story house known to be a launching pad for attacks against coalition forces, according to US Central Command. The house, located about two miles northwest of Khalidiyah, had been used on six different occasions to attack coalition forces. Improvised explosive device-making materials in the house were destroyed in the attack.

Travis C-5 Takes Licking, Keeps Ticking

A surface-to-air missile fired by hostile forces in Baghdad on 8 January destroyed the number-four engine of a Travis C-5B, California-based C-5 shortly after takeoff. The eleven crewmembers, fifty-two passengers, and the aircraft made it safely back to the ground. The engine was replaced on 14 January at a forward location in Southwest Asia. The aircraft was then flown to Ramstein Air Logistics Center, Georgia, for full repairs. On 5 March, Gen. John Handy, commander of US Transportation Command and Air Mobility Command, presented Air Medals for meritorious achievement to the flight crew for their roles in recovering the aircraft. The other crewmembers received Air Force Commendation Medals.

Second Quarter 2004

Code One

32

nautical miles. The C-27J cruises at speeds better than 312 KTAS.

The C-27J has been rated to transport payloads in and out of hard packed clay, gravel, or dirt runways, operating from a 1,900-foot field at the normal takeoff and landing weights of 67,240 pounds and 60,630 pounds, respectively. The Spartan can transport 18,000 pounds of payload 500 nautical miles into that 1,900-foot field and recover with 4,500 pounds in the same distance. The C-27J's short takeoff and landing ability makes it an ideal platform for operating from the many short, unpaved strips in current theaters.

Also, an airlifter must be able to come into an area at a higher altitude to avoid surface-to-air threats such as shoulder-fired missiles, descend at a rapid rate, land in a limited amount of space, unload, and get out fast. The C-27J's integral countermeasure capabilities add another degree of safety in such hostile environments.

The C-27J is pressurized and can maintain a sea level altitude up to 13,500 feet for medical evacuation missions. The C-27J has individual oxygen lines for thirty-six litter patients and six attendants and sufficient reserve power for medical support equipment.

The C-27J's cargo ramp can be raised and lowered in flight with a seven- by eight-foot opening to allow airdrop loads up to 13,230 pounds on a single platform or up to 19,400 pounds on multiple platforms. The maximum airdrop speed is 180 knots. The Spartan can accommodate up to sixty-eight troops in a high-density seating option, forty-six combat troops, or thirty-four paratroopers.

The aircraft is operated by a crew of three, two pilots and a loadmaster,
with the pilots experiencing low workloads, as demonstrated during evaluations on the test aircraft. The digital avionics, like the suite in the C-130J, are compatible with night-vision goggles, as is the lighting in the cargo hold. The aircraft has a low-power color weather radar, which has long range and can detect wind shear. The radar also has a ground-mapping mode.

**COMING TO A THEATER NEAR YOU**
The US Army will be considering the C-27J as a candidate for its new Future Cargo Aircraft competition that will first augment and then likely replace the C-23 Sherpa. The program calls for twenty-five aircraft initially with the aircraft going to the Army National Guard.

**CHANGES IN OPERATIONS**
The coming of the C-130J will lead to some changes in how the ROAF operates its herc. In Kyrgyzstan, the small size of the Danish fleet led to an innovative agreement in which the unit worked closely with C-130H units from the Netherlands and Norway. Each country brought a small supply of spare parts to form a parts pool. Denmark also brought aircraft generation equipment such as work stands and generators. "We had excellent cooperation with the Norwegians and the Dutch," notes Olsen. "For future actions, we will try to develop a similar relationship with the Royal Air Force and the Italians, as they are the only other nearby C-130 operators."

Anytime the Danish Hercules are off base for more than a day, a crew chief is normally deployed with them. "With the J, we expect we will be deploying more often and longer," Olsen adds. "On very long deployments, we will send avionics technicians, two crew chiefs, and limited spare parts. We will need to be a little more self-sufficient."

"We depend on local loading teams when we deploy," Jensen notes. "We usually carry two loadmasters and they can handle the ramp forward. We need help getting the load to the ramp, because we will be away from home station more, headquarters is looking into the feasibility of establishing an aerial port squadron that will go with us to a forward base."

One ROAF-specific mission is resupply of scientific stations and fishing outposts in Greenland, a Danish protectorate. While the squadron has no need to perform heavy equipment drops, some resupply flights, container delivery system drops are critical. The integral container delivery system falls in the C-130J will prove especially useful in this mission. In addition to dropping vital supplies such as food and fuel, 721 Squadron crews perform a highly unusual aerial task—dropping mail, gifts, and wrapped Christmas trees once a year to some of the remote stations on the Greenland ice cap.

"We make low-level flights in training, but not so much operationally," observes Jensen. "In the actual threat environment we are seeing, we fly high, get where we are going, and make a tactical approach. We don't do night-vision goggle operations in the C-130H, but we hope to do them with the C-130J. The addition of NVG ops is being staffed at Air Materiel Command, and we could see that in the short term. Even to go to Greenland in bad weather, an NVG capability will be very beneficial."

"I am positive that our lookings will increase," says Jensen. "Denmark doesn't need a real strategic airlift capability, but the C-130J will move us into that area without losing a tactical capability. Now when we go somewhere, we won't have to sit in the back as long because we'll get there a bit quicker."

Jeff Rhodes is the associate editor of Code One.
NEW BASE, NEW AIRCRAFT

The transition from a cosmopolitan world capital to a much smaller, industrial city near the North Sea has proven to be a challenge to the squadron. "Many of the wives were making more money in the private sector in Copenhagen than their husbands were in the military," notes Jensen. "But we have a lot of dedicated, motivated people who really love their jobs. And, if you want to fly Hercules in the Danish Air Force, Aalborg is now the only place to be."

The squadron also needed to retain flight engineers and navigators to keep their C-130H models flying until the fall while the C-130J1s came on line. "Since the J model requires fewer crewmembers, we offered to convert the flight engineers into loaders/masters," notes Jensen. "Only one said no, but he agreed to live here temporarily and get out of the service when the H models go away."

"We had eight navigators and most are getting promoted out of the squadron to staff jobs," Jensen adds. "The others will become observers on the Challengers for missions, such as fishery protection, and for sovereignty flights. Some of the navigators will be used in planning groups when we operate the C-130J abroad. We have a lot of experience we need to keep.""We will phase the J into service and the H out of service," says Olsen. "We have one small team that is dedicated to the C-130J. Gradually, the maintainers will transition to the J in groups and we will end up with one small team dedicated to the H model. We will have only a few people to train on the new aircraft early next year. It won't be difficult to support both the C-130H and the C-130J."

The unit has certainly put its three 1975-vintage C-130Hs to work. In addition to its normal airlift, search and rescue, and long-range patrol missions, 721 Squadron began conducting extensive operations outside of Denmark in the early 1980s. They made relief flights to Nigeria, Sudan, Turkey, and Albania after various natural and man-made disasters. On Christmas Day 2001, crews flew their first mission in support of Operation Enduring Freedom. Based in Kyrgyzstan, the unit's seven aircraft—the standard complement—conducted seventy-eight missions totaling nearly 450 hours flying into Afghanistan. Last year, the squadron flew its first missions into Iraq. Because they found they were frequently taking their C-130Hs into harm's way, the Danish Air Force installed a sophisticated electronic countermeasures suite in the aircraft in the early 1990s. That suite is also a prominent feature in the C-130J. The Group A modifications—basic survivability equipment such as chaff and flares—were installed on the three new aircraft at the factory in Marietta, Georgia. The more technologically advanced, Danish-specific Group B modifications were installed at Aalborg after the three new aircraft were delivered.

The Danish aircraft, the long-fuselage version of the C-130, feature a strengthened cargo ramp and improved airdrop system, allowing crews to make air drops at 250 knots, helping them avoid anti-aircraft fire in hostile areas. The Enhanced Cargo Handling System allows for rapidly converting the aircraft from hauling rolling stock to palletized cargo. Denmark also holds an option to buy a fourth C-130J.

Once the unit has fully converted to the new Super Hercules, the C-130Hs will be sold to another country. "We had one prospective customer come in a few months ago. They knew we had been flying our aircraft hard, but they were surprised what good shape they are in," Olsen notes, somewhat proudly.

Capt. Kasper Jensen, director of operations for 721 Squadron, also emerged as a potential buyer, with upward of sixty aircraft to be purchased for its air force, navy, border patrol, and coast guard.

In future years, the C-27J could become even more like the C-130. The Italian Air Force has ordered head-up cockpit displays and aerial refueling probes for its fleet of C-27Js. These options may be incorporated as baseline equipment in future aircraft off the production line. Now in development, these options will serve to further increase the operational utility and capability of the C-27J.

"The C-27J is a durable aircraft, a military airlifter from day one," says Yackel. "It is the right size and has exactly the right capabilities for a wide variety of tactical airlift missions."

Jeff Rhodes is the associate editor of Circle One.
THE WHITE BEAR GOES

The RDAF made the decision to close Værløse AB in 2000 for force consolidation. The base had been home to the 721st Airlift Squadron for fifty-one years. "I was asked to make a drawing for a new hangar at Aalborg four years ago," says Maj. Poul Olesen, the squadron’s chief of maintenance. "I am certainly not an architect, but I came up with four designs. I knew what we needed. Now, in early March 2001, we are occupying one of those designs. We still need some alarms and locks on some of the doors, but those are minor fixes. We have moved, and we are ready to go."

A new two-bay hangar at Aalborg, completed last December, has underfloor electrical and hydraulic connections. The electrical power generator is outside to reduce noise in the work area. The C-130F crew chiefs have an office on one end of the building and the crew chiefs for the Challenger aircraft are at the other end. The large building is tied to an existing hangar. The new maintenance complex was finished this spring.

"We combined the avionics shops and sheet metal shops for the C-130Fs and the F-16s in the hangar," notes Olesen. "The two powerplant shops are integrated in a building just outside. Putting like jobs together just makes sense. Of course, each aircraft requires some specialized skills, but the basic tasks are the same."

The military shares a runway with Aalborg's commercial airfield and has been the home of one of the RDAF's three F-16 squadrons for more than two decades.

The commercial air traffic and the modern maintenance complex appear out of place at a military base with hardened shelters, hangars, and dispersed buildings. Aalborg AB is a product of the Cold War—or what the Danes call the "Russian time."

The new home for 721st Airlift Squadron crews can be found about a mile from the new maintenance hangar. The building is the former headquarters for 723 Squadron, whose pilots had once flown Lockheed F-104s. It has since been refurbished and enlarged for its new occupants. Areas have been set aside for T-17 flight operations, search and rescue, both traditional and computerized mission planning, mission planning support, duty operations, and Challenger flight operations. Temporary offices have been built for Lockheed Martin flight crews who will help train the Danish crews. The squadron commander and director of operations have separate offices as well.

721st Squadron, established in 1926 as a Naval flying unit, is Denmark's oldest flying unit and is actually twenty-eight years older than the Royal Danish Air Force itself. To honor that heritage, the squadron has hung a propeller from a World War I era Hansa Brandenburg torpedo bomber on the wall of the crew briefing room with an outline of the aircraft painted behind it. The maintenance break room has its own historical artifacts. "We brought the mounted heads from a reindeer and a white bear from Værløse," says Olesen. "Nobody remembers how we acquired them, but everybody thought it was important that they made the move with us."

PHOTO BY JEFF RHODES

"Our job is to get the crews what they need, train them, qualify them, and get them out to the fight," says Lt. Col. David Kasberg, the commander of the 48th Airlift Squadron at Little Rock AFB, Arkansas. As the C-130J schoolhouse, this recently reactivated squadron, whose legacy dates back to World War II, will train every active-duty Air Force and Air National Guard crew that will fly the Super Hercules.

An important part of the curriculum at Hercules University was developed during Procedures Development and Evaluation, an intense, monthlong learning laboratory held at Little Rock this past winter. PD&E was designed to validate the tactics, techniques, and procedures C-130 crews will use. "Most pilots can stick and rudder a C-130," says Lt. Col. Chris Hain, the chief of Air Mobility Command's Operations Directorate. "PD&E is about learning to employ the C-130 as a weapon system."
A crowd of maintainers, staff, wives, and husbands stand in anticipation on the ramp at Aalborg AB in Denmark. They are building the planes and crew of 721 Squadron, the only transport unit of the Royal Danish Air Force, to arrive at their new home at this base in northern Jutland. The crowd cheers and waves as two Challenger 601 patrol/executive transport aircraft, three T-17 trainers, and two C-130Js make low passes over the runway. Soon, the day’s main attraction arrives—Denmark’s first C-130J Super Hercules. The Super Hercules crew is escorted by one of its new neighbors, a pilot flying an Aalborg-based F-16 from 726 Squadron. The C-130J landing marks the completion of 721’s relocation to Aalborg from Vælde AB near Copenhagen. The landing also marks a new era for the RDAF, which begins operating the Super Hercules this year.

The day after the arrival, a team of technicians from Air Materiel Command, the acquisition arm of the Danish Air Force; Terma, a Danish electronics firm; and avionics specialists from the base start installing RDAF-specific countermeasures on the aircraft. They begin their work early because they have a tight schedule to keep.

721 Squadron, the first C-130J operator in Scandinavia, is scheduled to be operational with its three new C-130Js in eight months. “We will officially be in training until October 2004,” notes Capt. Kasten Jensen, the director of operations for 721 Squadron. “I have told our air force bosses not to have too high expectations from us for six months. However, I am sure we will be tasked left, right, and center once they see what we can do with this aircraft.”

The 48th had trained instructors, and PD&E produced a more in-depth knowledge of what the unit needed to teach. The once the training unit didn’t have was its own aircraft. After buying borrowed aircraft since the squadron stood up in late 2003, the first C-130J for the 48th was formally accepted in ceremonies at the base on 16 April. J-Scholl now in session.

Getting There Is Half the Fun
Air Education and Training Command officials made the decision in 2003 to have the 314th Air Wing at Little Rock set up a separate squadron to train C-130J crews. Both the 33rd and 62nd Airlift Squadrons fly C-130Es, and the original plan was to incorporate J model training with the existing C-130 training squadrons.

“If you had a plan for the assignment last August,” notes Kasberg, “I moved here from Germany in September. Two months later, I stood up the squadron. We went from having no aircraft, no permanently assigned people, and no budget to having an initial instructor cadre trained in just over two months. Then you had to find a building to operate out of, move in, and get aircraft. This assignment could not have been more challenging.”

By late winter, the squadron had five pilots who had previously qualified on the C-130J. “These pilots formed our primary instructors,” says Kasberg. “They trained the trainers, basically. A majority of the squadron crew came over from the C-130E and have crossed the technological chasm between a 1960s-vintage aircraft and the modern C-130J. The squadron also included three pilots and three loadmasters with no previous C-130 experience—they transitioned from the C-17.

“It is a good thing to get a non-C-130 group in here,” notes Kasberg. “The things the Air Force is doing on the C-17—overwater missions without a navigator, Category II [bad weather] instrument landing procedures, using a mission computer—all of that is good experience for the rest of us. That group also has some fresh ideas about how to use the C-130J.”

The squadron began operations with WC-130Js borrowed from the 53rd Weather Reconnaissance Squadron at Keesler AFB, Mississippi. Using loaned aircraft has worked, but it has resulted in some minor spare parts issues—parts for the aircraft in Little Rock have to be shipped from Mississippi.

“We appreciate the loaners, but having our own aircraft and our own parts would solve some availability issues. We are managing pretty well, though,” notes Kasberg. The squadron is trying to be aggressive in its approach to training to get its crews qualified quickly. For example, they are scheduling three sorties per day. “Despite being new to this aircraft, our maintenance crews have done a very good job for us,” says Kasberg. “We were not fully manned for a three-flight day in the early spring, and for a 0700 takeoff, maintainers had to be here at three or four in the morning. After a landing at midnight, they remain here after the students and instructors leave.”

The loaned aircraft are also short-fuselage J models, and the 48th will be training on aircraft that have a fuselage that is fifteen feet longer. “The long- and short-fuselage C-130Js have some subtle differences that will affect how we train,” notes Kasberg.

The 84th Airlift Squadron will receive seven aircraft over the next two years, including two this summer. Eventually, the unit will have fifteen assigned C-130Js. Ultimately, the squadron will have approximately thirty pilots and twenty-five loadmasters.

To accommodate the new squadron and new aircraft, construction projects totaling nearly $100 million have changed the landscape at Little Rock. Construction on a new training facility for C-130K, H, and J model maintainers is under way and is expected to be completed in early 2005. A new engine and propeller storage facility opens this year. A new hangar will fully enclose two of the squadron’s aircraft.

The new 40,000-square-foot C-130J simulator building encloses two motion-based weapon system
trainers and two smaller stationary trainers, as well as classrooms, a scheduling office, student publications library, and a student learning center. Run by Lockheed Martin Simulation, Training and Support Company and known as the C-130J Maintenance and Aircrew Training System, or JMATS, the facility is used for basic aircraft qualification and initial and refresher cockpit resource management training, instrument refresher courses, and instructor preparatory courses. The facility opened for business in early March.

Learning What To Train

"We ran up against a deadline because the training courseware and the simulator were delivered on 1 March," says Hair. "How does an instructor teach a procedure if it has never been done? How is the courseware validated? That's what we tried to accomplish during the latest phase of PDRE. Ultimately, we want to give the combat commander a crew that brings something to the table—something that a commander can use in the fight."

The overarching objective of PDRE is to describe a way forward to operational capability with the C-130J. The group will provide the US C-130J community

"Ultimately, we want to give the combat commander a crew that brings something to the table—something that a commander can use in the fight."

Many of these HAF F-16s have been equipped with both LANTIRN and Litening pods as well as advanced electronic warfare suites. Greece ordered fifty new Block 52+ F-16s in June 2000 and exercised an option for an additional ten in 2001. These advanced F-16s, the first production Fighting Falcons delivered with conical fuel tanks, began arriving in Greece in late 2003. The last of the sixty Block 52+ aircraft are scheduled to arrive in Greece in August 2004.

"The two Block 52+ F-16 units being formed on Crete are pulling some of our more experienced F-16 pilots from the three squadrons at Nea Anchialos," explains Lt. Col. Ioannis Psiodis, the commander of the 330 Squadron. "As a squadron commander, I am continuously trying to replenish this lost experience. We concentrate on increasing the skills of our newest F-16 pilots in a safe environment, Nea Anchialos is an ideal location for this training. We have many places to fly both air-to-air and air-to-ground missions. I'm satisfied with our F-16s. No, I love the F-16, especially the Block 30. I consider Block 30 as a perfect balance for air-to-air missions. It's a very capable platform."

Kazuhito Takahashi is an aviation photographer based in Japan.
with the written policies and procedures necessary to support ongoing test and evaluation, develop training, and refine operational concepts. A secondary purpose is to evaluate, develop, and verify corrections and workarounds for any deficiencies identified during the flight tests and quantify them—taking accumulated wisdom and making sure it is written down.

In fall 2002, AMC collected all of the procedures that governed flying legacy Hercules aircraft, the written reports from the Royal Air Force detailing that service’s C-130J operational experience, as well as C-17 operational procedures.

“We locked all the subject matter experts in a room and told them to write a procedure for, say, single-ship night airdrop and not come out until they had a procedure everyone agreed on,” notes Hair. “Then we went back and did the same thing for formation drops. At the end of this, we had a stack of new, but unproven, procedures that combined the old way of working a Herc with new things like a head-up display and a mission computer.”

Adds Maj. Sean Bordenave, the project officer and a pilot with AMC’s Operations Modernization Division: “After the group developed a procedure, they flew it in the simulator to see if it would work. They spent almost fifty hours in the sim. From an aircrew perspective, though, we never believe anything until we experience it firsthand.” Single-ship mission employment capabilities and procedures were evaluated in flights hosted last fall by
the 143rd Airlift Wing, the Air National Guard unit based at Quonset State Airport near Providence, Rhode Island. Specifically, the test team evaluated low-level daylight and night-vision goggle operations, time-control functions, airdrops, and NVG ariland. The flights provided an opportunity to evaluate aircraft systems during missions and valuable insight into tactical training.

The next phase, held at Little Rock in February 2004, tested formation flying during the day and night using what one pilot called a crawl, walk, run approach. Five different C-130J units, including ANG units from California, Rhode Island, and Maryland, the Air Force Reserve Command unit from Keeler, and the host 48th Airlift Squadron, conducted the tests using seven aircraft. The 415th, which has been using its C-130s operationally for several years, sent advisors as well.

"The whole process was done on a shoestring budget," observes Hain. "The group wants to get out of the mode of flying around the flagpole and go and do something with their [s. We want to move forward. The Guard and Reserve guys picked up their own tab because they are interested and excited about the C-130]. None of this was a funded effort."

The first of the three weeks of testing consisted of flying four-hour low-level day formation flights and going through airdrop procedures down to 300-foot altitudes. The second week consisted of formation flights using the aircraft's coordinated aircraft positioning station keeping equipment, or CAPS, and formation airdrop procedures. The final week consisted of NVG visual formation and airdrop procedures working down to low altitudes.

"We answered some very detailed questions mostly through trial and error and experience," says Bordenave. "No one did any freelancing. If someone had developed a technique or had a rule of thumb, we listened to him. If we tested the suggestion and it worked, we included it in the procedure. We faced a lot of unknowns, but a lot of
Nea Anchialos AB is located on the Adriatic coast just south of Volos, which is at about the midpoint between Athens to the south and Thessaloniki to the north, Greece’s largest and second-largest cities, respectively. Nea Anchialos is in Greece’s Pelion region, which is known as the land of the mythical Centaurs, creatures with a body half human and half horse. Today, the region is better known by tourists and locals for its beautiful combination of verdant mountains and clear blue sea. Nea Anchialos based F-16 pilots are treated to stunning vistas from the best seat in the world.

The wing’s diverse squadrons—flying SEAD, air-to-air, and air-to-ground missions—provide a unique training environment. “The 11th can create what amounts to a composite package with its own aircraft,” notes Vrizadinos. “We don’t need to ask for support or escort from other bases to provide realistic training. I expect that the block 52+ squadrons being formed at Puda in Crete will have the same capability, but in a single F-16 type.”

Col. Elias Vrenetis, deputy base commander at Nea Anchialos, was also a member of the first six Greek pilots trained in the F-16. “When I was introduced to F-16, the biggest challenge was transitioning from a second-generation fighter, the F-5, to a third-generation fighter,” Vrenetis recalls. “The F-16 was full of avionics and provided capabilities far beyond the F-5. Pilots transitioning to the F-16 had to change their way of thinking. Former F-5, F-4, and A-7 pilots had to forget old habits and learn new ones. This was the biggest challenge in training new F-16 pilots, which became the responsibility of our initial group of six. We did a good job. The HAF didn’t have one accident or any major problems in these early stages of the program.”

The HAF has added to and upgraded its F-16 fleet since the late 1980s. Beginning in 1996, Hellenic Aerospace Industry performed structural upgrades on its Block 30 fleet (purchased under the Peace Xenia I program). The upgrade, called Falcon-Up, prolongs the airframe lifetime from 4,000 hours to 8,000 hours. Peace Xenia II resulted in the purchase of the Block 50 F-16s now flying from two squadrons at Nea Anchialos.

The CAP SKE system in the C-130J is designed to allow the pilot to fly virtually hands-off during formation flights. The system works well. “However, in turns, the system is too aggressive for how we plan to employ the aircraft flying in formation in weather,” notes Bordenave. “The new Block 5.4 computer software that will be installed in the J fleet this year will fix that. We were able to provide direct, instant feedback to this upgrade process.”

“We had the Total Force experts from the Guard, Reserve, AMC, Lockheed Martin, AETC, and even the RAF during PD&E,” Bordenave adds. “We need to use the automation inherent in the aircraft to our advantage. With that much brainpower in one room, we capitalized on what we were doing. People have seen an E or an H and think it’s just another Hercules. They don’t see its real capability.”

“Despite being new to this aircraft, our maintenance crews have done a very good job for us.”
F-16s Over The Aegean

The 330th has three sister squadrons at Nea Anchialos, 346 Squadron (Jason, after the mythical Argonaut who searched for the Golden Fleece), 341 Squadron (Aeolus, Greek for Ace), and the 347 Squadron (Perseus, who cut the head off the Gorgon Medusa in Greek mythology). The 330th flies Block 30 F-16s and performs air defense missions. The 346th, an F-16 training unit, operates two-seat Block 30 F-16Ds borrowed from the 330th. The 341st flies Block 30 F-16s in the suppression of enemy air defense, or SEAD, role. All three squadrons fall under the 111 Wing of the Hellenic Air Force.

Greece has been a member of NATO since 1952 and has played an important role in defending NATO’s southern flank. The 111th has a NATO commitment as well. The 341st Squadron is part of NATO’s RAPID Reaction Force. Following NATO evaluations in 2005, all three operational squadrons at Nea Anchialos are expected to have NATO commitments.

Col. John Vizandios, who commands the 111 Wing, was one of the first F-16 pilots in the HAF. “I was fortunate to be in the initial team of six Greek pilots who received F-16 training in the United States in the late 1980s,” he explains. “All six of us were on the runway here at Nea Anchialos in 1988 waiting for the first flight of F-16s to arrive.” Vizandios is a former F-4 pilot. Other veteran HAF F-16 pilots have experience in the F-5, Mirage, and the F-104.
Keraunos, Greek for Lightning, refers to the thunderbolts flung by Zeus, the supreme ruler of Mount Olympus and overseer of the pantheon of gods who reside there. The Hellenic Air Force attaches the appellation to its 330 Squadron at Nea Anchialos AB. The 330 Keraunos Squadron proudly identifies itself as Greece's first F-16 squadron. The unit celebrated fifteen years in its fighting Falcons in January 2004.

F-16s Over The Aegean

The 330th has three sister squadrons at Nea Anchialos, 346 Squadron (Jason, after the mythical Argonaut who searched for the Golden Fleece), 341 Squadron (Ares, Greek for Ace), and the 347 Squadron (Perseus, who cut the head off the Gorgon Medusa in Greek mythology). The 330th flies Block 30 F-16s and performs air defense missions. The 346th, an F-16 training unit, operates two-seat Block 30 F-16Ds borrowed from the 330th. The 341st flies Block 30 F-16s in the suppression of enemy air defense, or SEAD, role. All three squadrons fall under the 111 Wing of the Hellenic Air Force.

Greece has been a member of NATO since 1952 and has played an important role in defending NATO's southern flank. The 111th has a NATO commitment as well. The 341 Squadron is part of NATO's Rapid Reaction Force. Following NATO evaluations in 2005, all three operational squadrons at Nea Anchialos are expected to have NATO commitments.

Col. John Vizandios, who commands the 111 Wing, was one of the first F-16 pilots in the HAF. "I was fortunate to be in the initial team of six Greek pilots who received F-16 training in the United States in the late 1980s," he explains. "All six of us were on the runway here at Nea Anchialos in 1988 waiting for the first flight of F-16s to arrive." Vizandios is a former F-4 pilot. Other veteran HAF F-16 pilots have experience in the F-5, Mirage, and the F-104.
Nea Anchialos AB is located on the Adriatic coast just south of Volos, which is at about the midpoint between Athens to the south and Thessaloniki to the north, Greece's largest and second-largest cities, respectively. Nea Anchialos is in Greece's Pella region, which is known as the land of the mythical Centaurs, creatures with a body half human and half horse. Today, the region is better known by tourists and locals for its beautiful combination of verdant mountains and clear blue sea. Nea Anchialos based F-16 pilots are treated to stunning vistas from the best seat in the world.

The wing's diverse squadrons—flying SEAD, air-to-air, and air-to-ground missions—provide a unique training environment. "The 111th can create what amounts to a composite package with its own aircraft," notes Vizeadis. "We don't need to ask for support or escort from other bases to provide realistic training. I expect that the Block 52+ squadrons being formed at Fuds in Crete will have the same capability, but in a single F-16 type."

Col. Ilia Veneiris, the deputy base commander at Nea Anchialos, was also a member of the first six Greek pilots trained in the F-16. "When I was introduced to F-16, the biggest challenge was transitioning from a second-generation fighter, the F-5, to a third-generation fighter," Veneiris recalls. "The F-16 was full of avionics and provided capabilities far beyond the F-5. Pilots transitioning to the F-16 had to change their way of thinking. Former F-5, F-4, and A-7 pilots had to forget old habits and learn new ones. This was the biggest challenge in training new F-16 pilots, which became the responsibility of our initial group of six. We did a good job. The HAF didn't have one accident or any major problems in these early stages of the program."

The HAF has added to and upgraded its F-16 fleet since the late 1980s. Beginning in 1996, Hellenic Aerospace Industry performed structural upgrades on its Block 30 fleet (purchased under the Peace Xenia I program). The upgrade, called Falcon-Up, prolongs the airframe lifetime from 4,000 hours to 8,000 hours. Peace Xenia II resulted in the purchase of the Block 50 F-16s now flying from two squadrons at Nea Anchialos.

excellent solutions came out of the testing, particularly in the areas of CAP SKE.

The CAP SKE system in the C-130J is designed to allow the pilot to fly virtually hands-off during formation flights. The system works well. "However, in turns, the system is too aggressive for how we plan to employ the aircraft flying in formation in weather," notes Bordenave. "The new Block 5.4 computer software that will be installed in the future will fix that. We were able to provide direct, instant feedback to this upgrade process."

"We had the Total Force experts from the Guard, Reserve, AMC, Lockheed Martin, AETC, and even the RAAF during PD&E," Bordenave adds. "We need to use the automation inherent in the aircraft to our advantage. With that much brainpower in one room, we capitalized on what we were doing. People have seen an E or an H and think the J is just another Hercules. They don't see its real capability."

Despite being new to this aircraft, our maintenance crews have done a very good job for us."

The team prepared a final report and worked closely with the groups developing the checklists and publications to incorporate the knowledge gained during PD&E. "Then we will send them out as the operating instructions for the weapon system," says Hair.

The final phase of PD&E will involve developing procedures for heavy equipment airdrops from the C-130J and maximizing interoperability between the C-130J and the legacy C-130E and H models. "We will be evaluating procedures to find commonality between the two airframes to better employ both aircraft to the maximum extent possible," concludes Bordenave. "We want to make it easier for crews to employ the C-130J in combat."

Jeff Blokes is the associate editor of Code One.
the 143rd Airlift Wing, the Air National Guard unit based at Quonset State Airport near Providence, Rhode Island. Specifically, the test team evaluated low-level daylight and night-vision goggle operations, time-control functions, airdrops, and NVG airlift. The flights provided an opportunity to evaluate aircraft systems during missions and valuable insight into tactical training.

The next phase, held at Little Rock in February 2004, tested formation flying during the day and night using what one pilot called a crawl, walk, run approach. Five different C-130J units, including ANG units from California, Rhode Island, and Maryland, the Air Force Reserve Command unit from Keeler, and the host 48th Airlift Squadron, conducted the tests using seven aircraft. The NAF, which has been using its C-130J operationally for several years, sent advisors as well.

"The whole process was done on a shoestring budget," observes Haiti. "The group wants to get out of the mode of flying around the flagpole and go and do something with their [s. We want to move forward. The Guard and Reserve guys picked up their own tab because they are interested and excited about the C-130J. None of this was a funded effort."

The first of the three weeks of testing consisted of flying four-hour low-level day formation flights and going through airdrop procedures down to 300-foot altitudes. The second week consisted of formation flights using the aircraft's coordinated aircraft positioning station keeping equipment, or CAP SKE, and formation airdrop procedures. The final week consisted of NVG visual formation and airdrop procedures working down to low altitudes.

"We answered some very detailed questions mostly through trial and error and experience," says Bordenave. "No one did any freelancing. If someone had developed a technique or had a rule of thumb, we listened to him. If we tested the suggestion and it worked, we included it in the procedure. We faced a lot of unknowns, but a lot of
with the written policies and procedures necessary to support ongoing test and evaluation, develop training, and refine operational concepts. A secondary purpose is to evaluate, develop, and verify corrections and workarounds for any deficiencies identified during the flight tests and quantify them—taking accumulated wisdom and making sure it is written down.

In fall 2002, AMC collected all of the procedures that governed flying legacy Hercules aircraft, the written reports from the Royal Air Force detailing that service's C-130J operational experience, as well as C-17 operational procedures.

"We locked all the subject matter experts in a room and told them to write a procedure for, say, single-ship night airdrop and not come out until they had a procedure everyone agreed on," notes Hair. "Then we went back and did the same thing for formation drops. At the end of this, we had a stack of new, but unproven, procedures that combined the old way of working a Herc with new things like a head-up display and a mission computer."

Adds Maj. Sean Bordenave, the project officer and a pilot with AMC's Operations Modernization Division: "After the group developed a procedure, they flew it in the simulator to see if it would work. They spent almost fifty hours in the sim. From an aircrew perspective, though, we never believe anything until we experience it firsthand."

Single-ship mission employment capabilities and procedures were evaluated in flights hosted last fall by
Learning What To Train

"We ran up against a deadline because the training courseware and the simulator were delivered on 1 March," says Hair. "How does an instructor teach a procedure if it has never been done? How is the courseware validated? That's what we tried to accomplish during the latest phase of PD&E. Ultimately, we want to give the combat commander a crew that brings something to the table—something that a commander can use in the fight."

The overarching objective of PD&E is to describe a way forward to operational capability with the C-130J. The group will provide the US C-130J community

"Ultimately, we want to give the combat commander a crew that brings something to the table—something that a commander can use in the fight."

Many of these HAF F-16s have been equipped with both LANTIRN and Litening pods as well as advanced electronic warfare suites. Greece ordered fifty new Block 52+ F-16s in June 2000 and exercised an option for an additional ten in 2001. These advanced F-16s, the first production Fighting Falcons delivered with conformal fuel tanks, began arriving in Greece in late 2003. The last of the sixty Block 52+ aircraft are scheduled to arrive in Greece in August 2004.

"The two Block 52+ F-16 units being formed on Crete are pulling some of our more experienced F-16 pilots from the three squadrons at Nea Anchialos," explains Lt. Col. Ioannis Podiotis, the commander of the 330 Squadron. "As a squadron commander, I am continuously trying to replenish this lost experience. We concentrate on increasing the skills of our newest F-16 pilots in a safe environment, Nea Anchialos is an ideal location for this training. We have many places to fly both air-to-air and air-to-ground missions. I'm satisfied with our F-16s. No, I love the F-16, especially the Block 30. I consider Block 30 as a perfect balance for air-to-air missions. It's a very capable platform."

Kazahide Takamika is an aviation photographer based in Japan.
The 48th had trained instructors, and PdAE produced a more in-depth knowledge of what the unit needed to teach. The one asset the training unit didn't have was its own aircraft. After flying borrowed aircraft since the squadron stood up in late 2003, the first C-130J for the 48th was finally accepted in ceremonies at the base on 16 April. Training now in session.

Getting There Is Half The Fun

Air Education and Training Command officials made the decision in 2003 to have the 314th Airlift Wing at Little Rock set up a separate squadron to train C-130J crews. Both the 33rd and 62nd Airlift Squads by C-130Es, and the original plan to incorporate C-130 training with the existing C-130 training squadrons.

"I found out about the assignment last August," says Kasberg, "I moved here from Germany in September. Two months later, we stood up the squadron. We went from having no aircraft, no permanently assigned people, and no budget to having an initial instructor cadre trained in just over two months. Then we had to find a building to operate out of, move in, and get aircraft. This assignment cannot have been more challenging."

By late winter, the squadron had five pilots who had previously qualified on the C-130. "These pilots formed our primary instructors," says Kasberg. "They trained the trainers, basically. A majority of the squadron crew personnel came over from the C-130E and have crossed the technological chasm between a 1960s-vintage aircraft and the modern C-130. The squadron also included three pilots and three loadmasters with no previous C-130 experience—they transitioned from the C-17."

"It is a good thing to get a non-C-130 group in here," notes Kasberg. "The things the Air Force is doing on the C-17—overwater missions without a navigator, Category II [bad weather] instrument landing approaches, using a mission computer—all of that is good experience for the rest of us. That group also has some fresh ideas about how to use the C-130."

The squadron began operations using WC-130Js borrowed from the 53rd Weather Reconnaissance Squadron at Keesler AFB, Mississippi. Using loaned aircraft has worked, but it has resulted in some minor parts issues—parts for the aircraft in Little Rock have to be shipped from Mississippi.

"We appreciate the loaners, but having our own aircraft and our own parts would solve some availability issues. We are managing pretty well, though," notes Kasberg.

The squadron is trying to be aggressive in its approach to training to get its crews qualified quickly. For example, they are scheduling three sorties per day. "Despite being new to this aircraft, our maintenance crews have done a very good job for us," says Kasberg. "We were not fully manned for a three-flight day in the early spring, and for a 0700 takeoff, mainta- iners had to be here at three or four in the morning. After a landing at midnight, they remain here after the students and instructors leave."

The loaned aircraft are also short-fuselage J models, and the 48th will be training on air- craft that have a fuselage that is fifteen feet longer. "The long- and short-fuselage C-130Js have some subtle differences that will affect how we train," notes Kasberg.

The 48th Airlift Squadron will receive seven aircraft over the next two years, including two this summer. Eventually, the unit will have fifteen assigned C-130Js. Ultimately, the squadron will have approximately thirty pilots and twenty-five loadmasters.

To accommodate the new squadron and new aircraft, construction projects totaling nearly $51 million have changed the landscape at Little Rock. Construction on a new training facility for the C-130E, H, and J model maintainers is under way and is expected to be completed in early 2005. A new engine and propeller storage facility opens this year. A new hangar will fully enclose two of the squadron's aircraft.

The new 40,000-square-foot C-130J simulator building encloses two motion-based weapon systems.
THE WHITE BEAR GOES
The RDAF made the decision to close Varlese AB in 2000 for force consolidation. The base had been 721 Squadron’s home for fifty-one years. “I was asked to make a drawing for a new hangar at Aalborg four years ago,” says Maj. Poul Olsen, the squadron’s chief of maintenance. “I am certainly not an architect, but I came up with four designs. I knew what we needed. Now, in early March 2004, we are occupying one of those designs. We still need some alarms and locks on some of the doors, but those are minor fixes. We have moved, and we are ready to go.”

A new two-bay hangar at Aalborg, completed last December, has underground electrical and hydraulic connections. The electrical power generator is outside to reduce noise in the work area. The C-130J crew chiefs have an office on one end of the building and the crew chiefs for the Challenger aircraft are at the other end. The large building is tied to an existing hangar. The new maintenance complex was finished this spring.

“The combined avionics shops and sheet metal shops for the C-130J and the F-16s in the hangar,” notes Olsen. “The two powerplant shops are integrated in a building just outside. Putting like jobs together just makes sense. Of course, each aircraft requires some specialized skills, but the basic tasks are the same.”

The military shares a runway with Aalborg’s commercial airfield and has been the home of one of the RDAF’s three F-16 squadrons for more than two decades.

The commercial air traffic and the modern maintenance complex appear out of place at a military base with hardened shelters, hardenedstands, and dispersed buildings. Aalborg AB is a product of the Cold War—or what the Danes call the “Russian time.”

The new home for 721 Squadron’s aircraft can be found about a mile from the new maintenance hangar. The building is the former headquarters for 723 Squadron, whose pilots had once flown Lockheed F-104s. It hassince been refurbished and enlarged for its new occupants. Areas have been set aside for F-17 flight operations, search and rescue, both traditional and computerized mission planning, mission planning support, duty operations, and Challenger flight operations. Temporary offices have been built for Lockheed Martin flight crews who will help train the Danish crews. The squadron commander and director of operations have separate offices as well.

721 Squadron, established in 1926 as a Naval flying unit, is Denmark’s oldest flying unit and is actually twenty-eight years older than the Royal Danish Air Force itself. To honor that heritage, the squadron has hung a propeller from a World War I era Hansa Brandenburg torpedo bomber on the wall of the crew briefing room with an outline of the aircraft painted behind it. The maintenance break room has its own historical artifacts. “We brought the mounted heads of a reindeer and a white bear from Varlese,” says Olsen. “Nobody remembers how we acquired them, but everybody thought it was important that they make the move with us.”

Our job is to get the crews what they need, train them, qualify them, and get them out to the fight,” says Lt. Col. David Kasberg, the commander of the 48th Airlift Squadron at Little Rock AFB, Arkansas. As the C-130J schoolhouse, this recently reactivated squadron, whose legacy dates back to World War II, will train every active-duty Air Force and Air National Guard crew that will fly the Super Hercules.

A nimportant part of the curriculum at Hercules University was developed during Procedures Development and Evaluation, an intense, monthlong learning laboratory held at Little Rock this past winter. PD&E was designed to validate the tactics, techniques, and procedures C-130 crew will use. “Most pilots can stick and rudder a C-130,” says Lt. Col. Chris Hair, the chief of Air Mobility Command’s Operations Directorate. “PD&E is about learning to employ the C-130J as a weapon system.”
NEW BASE, NEW AIRCRAFT

The transition from a cosmopolitan world capital to a much smaller, industrial city near the North Sea has proven to be a challenge to the squadron. "Many of the wives were making more money in the private sector in Copenhagen than their husbands were in the military," notes Jensen. "But we have a lot of dedicated, motivated people who really love their jobs. And, if you want to fly Hercules in the Danish Air Force, Aalborg is now the only place to be."

The squadron also needed to retain flight engineers and navigators to keep its C-130H models flying until the fall while the C-130J begins to arrive. "Since the J model requires fewer crewmembers, we offer the flight engineers into loadmasters," notes Jensen. "Only one said no, but he agreed to live here temporarily and get out of the service when the H models go away."

"We have eight navigators and most are getting promoted out of the squadron to staff jobs," Jesperson adds. "The others will become observers on the Challenger for missions, such as fishery protection, and for sovereignty flights. Some of the navigators will be used in planning groups when we operate the C-130J abroad. We have a lot of experience we need to keep."

"We will phase the J into service and the H out of service," says Olsen. "We now have one small team that is dedicated to the C-130J. Gradually, the maintainers will transition to the J in groups and we will end up with one small team dedicated to the H model. We will have only a few people to train on the new aircraft early next year. It won't be difficult to support both the C-130H and the C-130J."

The unit has certainly put its three 1975-vintage C-130Hs to work. In addition to its normal airlift, search and rescue, and long-range patrol missions, 721 Squadron began conducting extensive operations outside of Denmark in the early 1980s. They made relief flights into Nigeria, Sudan, Turkey, and Albania after various natural and man-made disasters. On Christmas Day 2001, crew flew their first mission in support of Operation Enduring Freedom. Based in Kyrgyzstan, the unit's seven aircraft—the standard complement—conducted seventy-eight missions totaling nearly 450 hours flying into Afghanistan. Last year, the squadron flew its first missions into Iraq.

Because they found they were frequently taking their C-130Hs to harm's way, the Danish Air Force installed a sophisticated electronic countermeasures suite in the aircraft in the early 1990s. That suite is also a prominent feature in the C-130J. The Group A modifications—basic survivability equipment such as chaff and flares—are installed on all three new aircraft at the factory in Marietta, Georgia. The more technologically advanced, Danish-specific Group B modifications were installed at Aalborg after the three new aircraft were delivered.

The Danish aircraft, the long-fuselage version of the C-130J, feature a strengthened cargo ramp and improved airdrop system, to allow crew to make airdrops at 50 knots, helping them avoid antiaircraft fire in hostile areas. The Enhanced Cargo Handling System allows for rapidly converting the aircraft from hauling rolling stock to palletized cargo. Denmark also holds an option to buy a fourth C-130J.

Once the unit has fully converted to the new Super Hercules, the C-130Hs will be sold to another country. "We had one prospective customer come in a few months ago. They knew we had been flying our aircraft hard, but they were surprised what good shape they are in," Olsen notes, somewhat proudly.

National Missile Defense sites in Alaska. The first FCA is expected to be delivered approximately two years after contract award. The Army's Golden Knights precision parachute team, which is looking to replace its Fokker C-31 aircraft, is also a likely user for the FCA. The Knights flew to Turin in 2002, made several jumps out of one of the C-27J test aircraft to evaluate the Spartan, and reported that the aircraft is well matched to their stringent requirements.

Another important role for the FCA will be transporting vehicles used by the Weapons of Mass Destruction Civil Support Teams. These teams, which have already been established in states across the country, consist of twenty-two personnel and a fleet of ten large vehicles, including a van and associated trailers. They would be the first responders in a WMD-type disaster.

Other potential customers for a transport such as the FCA include the US State Department, which is flying four of the former Air Force C-27Js; Canada and Australia, both of which have a near-term requirement to replace aging aircraft—Canadian Buffalo aircraft in the search and rescue role and Australian C-130s in the light tactical airlift role; Bulgaria; and possibly Portugal, India has also emerged as a potential buyer, with upward of sixty aircraft to be purchased for its air force, navy, border patrol, and coast guard.

In future years, the C-27J could become even more like the C-130. The Italian Air Force has ordered head-up cockpit displays and aerial refueling probes for its fleet of C-27Js. These options may be incorporated as baseline equipment in future aircraft off the production line. Now in development, these options will serve to further increase the operational utility and capability of the C-27J."

"The C-27J is a durable aircraft, a military airlifter from day one," says Yackel. "It is the right size and has exactly the right capabilities for a wide variety of tactical airlift missions."

Jeff Rhodes is the associate editor of Circle One.
Changes in Operations

The coming of the C-130J will lead to some changes in how the ROAF operates its Heros. In Kyrgyzstan, the small size of the Danish fleet led to an innovative agreement in which the unit worked closely with C-130H units from the Netherlands and Norway. Each country brought a small supply of spare parts to form a parts pool. Denmark also brought aircraft generation equipment such as work stands and generators. "We had excellent cooperation with the Norwegians and the Dutch," notes Olsen. "For future actions, we will try to develop a similar relationship with the Royal Air Force and the Italians, as they are the only other nearby C-130 operators."

Anytime the Danish Heros are off base for more than a day, a crew chief is normally deployed with them. "With the J, we expect we will be deploying more often and longer," Olsen adds. "On very long deployments, we will send avionics technicians, two crew chiefs, and limited spare parts. We will need to be a little more self-sufficient."

"We depend on local loading teams when we deploy," Jensen notes. "We usually carry two loadmasters and they can handle the ramp forward. We need help getting the load to the ramp. Because we will be away from home station more, headquarters is looking into the feasibility of establishing an aerial port squadron that will go with us to a forward base."

One ROAF-specific mission is resupply of scientific stations and fishing outposts in Greenland, a Danish protectorate. While the squadron has no need to perform heavy equipment drops for these resupply flights, container delivery system drops are critical. The integral container delivery system itself in the C-130J will prove especially useful in this mission. In addition to dropping vital supplies such as food and fuel, 721 Squadron crews perform a highly unusual airdrop task—dropping mail, gifts, and wrapped Christmas trees once a year to some of the remote stations on the Greenland Ice Cap.

"We make low-level flights in training, but not so much operationally," observes Jensen. "In the actual threat environment we are seeing, we fly high, get where we are going, and make a tactical approach. We don't do night-vision goggle operations in the C-130H, but we hope to do them with the C-130J. The addition of NVG ops is being staffed at Air Material Command, and we could see that in the short term. Even to go to Greenland in bad weather, an NVG capability will be very beneficial."

"I am positive that our taskings will increase," says Jensen. "Denmark doesn't need a real strategic airlift capability, but the C-130J will move us into that area without losing a tactical capability. Now when we go someplace, we won't have to sit in the back as long because we'll get there a lot quicker."

Jeff Rhodes is the associate editor of Code One.

Coming to a Theater Near You

The US Army will be considering the C-27J as a candidate for its new Future Cargo Aircraft competition that will first augment and then likely replace the C-23 Sherpa. The program calls for twenty-five aircraft initially with the aircraft going to the Army National Guard.

The Sherpa, a commuter airliner that was converted to limited military use in the 1980s, is currently flown by Army Guard units in seventeen states and the Virgin Islands. Although originally adequate to meet the Army's needs, the service says the C-23 no longer meets current requirements—cargo transport, aerial delivery, medical evacuation—or evolving ones, such as supporting military operations.

With the pilots experiencing low workloads, as demonstrated during evaluations on the test aircraft, the digital avionics, like the suite in the C-130J, are compatible with night-vision goggles, as is the lighting in the cargo hold. The aircraft has a low-power color weather radar, which has long range and can detect wind shear. The radar also has a ground-mapping mode.

Second Quarter 2004
JASDF Humanitarian Mission Into Iraq
The Japan Air Self-Defense Force flew its first humanitarian mission into Iraq as part of coalition air forces, landing at Talil AB on 3 March. While the Self-Defense Forces have previously conducted humanitarian deployments to other locations in the world, this is the first time Japanese airmen have deployed to a conflict zone since the end of World War II. Flying from an undisclosed air base in Southwest Asia, the Japanese C-130 crew carried 5,000 pounds of supplies for the local people. Once at Talil, US and Japanese airmen took the cargo from the C-130 and loaded it aboard Japanese Ground Self-Defense Force trucks. The ground forces distributed the humanitarian supplies within Iraq.

Air Strike Targets Enemy Safe House
Two F-16s from the 51st Expeditionary Fighter Squadron dropped two Joint Direct Attack Munitions on an enemy safe house near Ar Ramadi, Iraq, on 27 December. Operation Stalking Stuffer was launched to destroy an abandoned two-story house known to be a launching pad for threats against coalition forces, according to US Central Command. The house, located about two miles northwest of Khalidiyah, was used on six different occasions to attack coalition forces. Improvised explosive device-making materials in the house were destroyed in the attack.

Travis C-5 Takes Licking, Keeps Ticking
A surface-to-air missile fired by hostile forces in Baghdad on 1 January destroyed the number-four engine of a Travis C-5, California-based C-5 just after takeoff. The eleven crewmembers, fifty-two passengers, and the aircraft made it safely back to the ground. The engine was replaced on 14 January at a forward location in Southwest Asia. The aircraft was then flown to Women Robinson Air Logistics Center, Georgia, for full repair. On 5 March, Gen. John Handy, commander of US Transportation Command and Air Mobility Command, presented Air Medals for meritorious achievement to the flight crew for their roles in recovering the aircraft. The other crewmembers received Air Force Commendation Medals.

Another significant design feature in the Spartan is its ability to kneel. A load can be transferred directly from a K-loader, forklift, or truckbed while the aircraft is level, or the C-27 can kneel on its main gear raising the nose in order to allow vehicles, such as a Humvee, to be driven on and driven off, or equipment, such as artillery pieces, to be easily rolled on or rolled off. The Spartan can carry a maximum payload of 25,350 pounds at 2,25 g's logistics load factor for 560 nautical miles. Alternatively, a 13,000-pound payload can be carried for 2,350 nautical miles. The C-27J cruises at speeds better than 312 KTAS. The C-27J has been rated to transport payloads in and out of hard packed clay, gravel, or dirt runways, operating from a 1,900-foot field at the normal takeoff and landing weights of 67,240 pounds and 60,630 pounds, respectively. The Spartan can transport 18,000 pounds of payload 500 nautical miles into that 1,900-foot field and recover with 4,500 pounds in the same distance. The C-27's short takeoff and landing ability makes it an ideal platform for operating from the many short, unpaved strips in current theaters. Also, an air lifter must be able to come into an area at a higher altitude to avoid surface-to-air threats such as shoulder-fired missiles, descend at a rapid rate, land in a limited amount of space, unload, and get out fast. The C-27J's integral countermeasure capabilities add another degree of safety in such hostile environments. The C-27J is pressurized and can maintain a sea level altitude up to 13,500 feet for medical evacuation missions. The C-27J has individual oxygen lines for thirty-six litter patients and six attendants and sufficient reserve power for medical support equipment. The C-27J's cargo ramp can be raised and lowered in flight with a seven- to eight-foot opening to allow airdrop loads up to 13,230 pounds on a single platform or up to 19,400 pounds on multiple platforms. The maximum airdrop speed is 180 knots. The Spartan can accommodate up to sixty-eight troops in a high-density seating option, forty-six combat troops, or thirty-four para troopers. The aircraft is operated by a crew of three, two pilots and a loadmaster.
MEET THE SPARTAN

With its 102-inch cabin height, the C-27J can carry three standard 463L loading system HCU-6/E pallets built up to an eighty-three-inch height. Two of those pallets can be used to carry up to 10,000 pounds of cargo each on the aircraft's 37.5-foot-long cargo floor. Alternatively, the aircraft can carry six HCU-12/E pallets loaded to an eighty-three-inch height while carrying 6,000 pounds on most of the pallets. Five of the pallets are set on the cargo floor and an additional pallet is set on the ramp in this configuration. The utility of 463L commonality is clear: the pallet must be able to be unloaded directly from a C-130 or larger aircraft, put on a smaller aircraft such as a C-27J, with no breakdown or reconfiguring, and taken directly to a forward-operating base. A load that can be carried directly on a C-27J must first be repackaged for the US government, as well as for any aircraft purchased through the foreign military sales program.

The Aeronautica Militare Italiana, or AMI, the Italian Air Force, announced its intention to buy the C-27J in September 2002. Greece followed in 2003 but went on contract first, so the Hellenic Air Force will be the first operator to receive the C-27J. The first of twelve aircraft will be delivered to Elefsis AB, Greece, starting in the first quarter of 2005. The five Italian aircraft will be stationed at Pisa AB, where the AMI’s existing C-222 and C-130J fleet is based. Greece holds an option for three additional aircraft. Italy holds an option for an additional seven C-27Js.

"Maintainers and pilots will begin training this summer," adds Yackel. "The National Training Center at Pisa, which was built for the C-130J, was designed with additional space to accommodate a C-27J weapon system-level simulator as well."

Aid To Chadian Forces

Two crews from the 377th Airlift Squadron at Ramstein AB, Germany, delivered nineteen tons of aid to Chad on 12 March in response to a request for assistance after Chadian military forces engaged a group of transnational terrorists and sustained casualties. Three Chadian soldiers were killed and sixteen were injured in the skirmish. The Ramstein crews were airborne only an hour after receiving the call. A little more than ten hours after takeoff, the crews landed on a 7,700-foot runway just outside of N’Djamena, and combat off-loaded nine pallets of food, blankets, and medical supplies.

Tyndall Trains First F/A-22 Pilot

Maj. Michael Heaphy recently became the first Tyndall-based pilot to complete his F/A-22 Raptor training at Tyndall AFB, Florida. The assistant director of operations for the 43rd Fighter Squadron, Heaphy is one of only a handful of Tyndall fighter pilots currently qualified to fly the F/A-22 and the first pilot to qualify in a Tyndall-stationed F-16C. Lt. Col. Jeffrey Hemigan, 43rd Fighter Squadron commander, and Maj. Steven L. Crotzer, a 43rd FS flight commander, both completed their training at Nellis AFB, Nevada. After the core cadre of seven pilots at Tyndall gets qualified by early spring, three other F-15 pilots are scheduled to arrive at the 43rd for F/A-22 training.

New F-16s For Israel

The F-16I, an Advanced Block 52 F-16 variant built for Israel, was flown for the first time on 23 December 2003. The Peace Marble V foreign military sales program will supply the Israel Air Force with 102 two-seat aircraft and is the largest Israel F-16 acquisition yet. The F-16I is specially designed for Israel and has been nicknamed "Softa," the Hebrew word for storm, by the IAF. Deliveries are scheduled through 2008.

Fighting Falcon Birthdays

The thirtieth anniversary of the first flight of the F-16 prototype was celebrated on 2 February. Company pilot Phil Deschler completed the first official flight of the YF-16 on 2 February 1974 from Edwards AFB, California. Deschler had also inadvertently flown the revolutionary aircraft two weeks earlier—Flight 0—when he elected to take the aircraft airborne after experiencing control anomalies during a high-speed test. The US Air Force celebrated twenty-five years of F-16 operations at Hill AFB, Utah, in January. The first F-16s assigned to an operational unit, the 388th Tactical Fighter Wing, arrived in January 1979. The wing was the first training unit, and the first wing to become operational with the new fighter.
Raptors Sharpen Talons

The T-422R VIPER test fleet at Edwards AFB, California, recently completed several important weapons tests. On 30 January, three missiles were launched within seconds of each other from two different aircraft. An AIM-9 was launched with the aircraft traveling at Mach 1.2, at an altitude of 5,000 feet, with a 100-degree-per-second roll rate. In another part of the sky, two guided AIM-120 shots were completed by pilots using the Rapier's infrared data link. The shots came while the aircraft were at Mach 1.3 at 30,000 feet looking down at the targets.

T-50 Testing Continues

Flight testing of the T-50 Golden Eagle supersonic trainer continues to go well, as air start flight testing of the F/A-18F/F-162 JET engine and external stores testing recently began. Flight testing with captive AIM-9 air-to-air missiles was initiated last year, and the first flight with external fuel tanks occurred on 7 February. These initial flights are to verify the T-50 aircraft's stability and control, flutter, and handling qualities with stores. Later flights will verify its performance, stores functionality and interfaces, and stores separation. Air start testing involves intentionally shutting down the engine in flight and re-starting it. The initial tests are designed to verify the air start envelope and procedures.

2003 Semper Viper Award

Maj. Edward Linch and Capt. Brian Wolf are the winners of the 2003 Joe Bill Dryden Semper Viper Award. The two pilots, both F-16 pilots, won the award for their distinguished service during a mission over western Iraq during Operation Iraqi Freedom. Linch commanded a one-ship sortie supporting a search-and-rescue mission during a four-hour vulnerability period. While on route, the pair received urgent calls on the emergency radio frequency from a coalition special forces team that was surrounded by a numerically superior enemy force only 300 meters away and closing. The pilots descended through hazardous weather conditions at night with low ceilings, poor visibility, and limited illumination to provide immediate air support for the trapped team. They used a combination of jet noise, flares, and bomb drops to provide time for the special forces troops to abandon their vehicles, break through the line of enemy troops, and escape toward a safe extraction point. Linch and Wolf are members of the 187th Fighter Wing of the Alabama Air National Guard based at Dannelly Field in Montgomery.

NATO F-16s Based in Lithuania

Shortly after Lithuania joined NATO on 29 March, a detachment of four Belgian F-16 AM-ALF Upgrade aircraft were flown to Siauliai AB to provide a quick action alert force over Baltic countries. This detachment will rotate with Danish and Norwegian F-16s on a long-term basis and represent the most easterly NATO presence in Europe and the closest to the Russian border. Lithuania, formerly a part of the Soviet Union, is one of seven new member countries to join NATO.

34 Code One

A military airlifter, the G-222, first flown in 1975, has always had a rugged design. Despite its nineteen-four-foot wingspan and seventy-five-foot length, the G-222/C-27 has an airframe that can comfortably accommodate up to three C-130s in flight. A total of 108 G-222s were built, including ten for the US Air Force, which operated them as C-27As until Howard AFB, Panama, in the early 1990s.

The G-222 was underpowered and had some high altitude and low altitude limitations that were evident in Panama," says Sam Yack, Lockheed Martin C-27 program manager. "Since the airframe was sound, we concentrated on propulsion and avionics in developing the G-222.

One original design concept was to use the quick engine change installation from the C-150 to the C-27. But that would have been a significant structural modification requiring the Spartan's airframe to be recertified. The G-222's existing nacelle design has instead modified to accommodate the 6,000 shp (Hercules AE-1107A) engine and its Rolls Royce AE-1107A engine and its Westland-designed nacelle would have no integration issues.

"We determined early in the process that developing a less capable avionics suite from scratch for the C-27 would require more time than reusing the integrated avionics from the C-130," notes Yack. "So we developed propulsion for the C-27 in the updated high-light of the program. We located our software engineers and avionics engineers right beside the Systems Integration Laboratory rather than separate them. That collected team became a vital link in establishing a virtual environment with engineers in Italy."

Only eighteen months after program go-ahead, Gianluca Evangelisti, Alenia's chief test pilot for transport aircraft and test pilot Agnito Frisiani flew the G-222 propulsion prototype for the first time on schedule on 23 September, from Alenia's flight test facilities at Caselle, Italy, near Turin. The second flight test aircraft—the first manufactured to the full production configuration and the first to have the advanced cockpit and full avionics suite—was flown on 12 May 2000. A third full-up C-27, an existing aircraft that was retrofitted with the new propulsion and avionics, joined the test fleet on 8 September 2000.

"We had a fully certified aircraft in short order," Yack recalls. With the US FAA certification of the propulsion system and avionics complete,
SPARTAN IN


T-50 Production Go-Ahead

The Republic of Korea awarded Korea Aerospace Industries a production contract for twenty-five T-50 Golden Eagle supersonic advanced jet trainers in mid-December. The contract covers the aircraft, automated mission equipment, integrated logistics support elements, and production start-up costs. The aircraft will be built at KAI's aircraft production facilities at Sacheon, South Korea, where it is currently being tested. The first production T-50 will be delivered in late 2005. Korea Aerospace Industries is the prime contractor for the T-50 full-scale development program, with Lockheed Martin as the principal subcontractor. The Republic of Korea Air Force is conducting the flight testing. The T-500 new will transition from the only supersonic trainer in development to the only one in production.

Coast Guard Hercs Stay Busy

The US Coast Guard has been busy with its new HC-130J, testing an MH-68A helicopter from the west coast, where it had been used in a drug interdiction, back to its home station in Jacksonville, Florida. In May, another MH-68 was flown from Jacksonville to the west coast. The unit also transported the members of Coast Guard Port Security Unit 308 on the final leg home after being deployed in Kuwait for seven months. The HC-130J crew, based at CGAS Elizabeth City, North Carolina, flew the team from NAS Norfolk, Virginia, to Gulfport, Mississippi, on 11 March. While deployed to the port of Ash Shuwaikh, Kuwait, PSN 308 ensured the safe flow of commercial and supplies to coalition forces participating in Operation Iraqi Freedom.

EPAF Evaluates F-16 M3

The European Participating Air Forces—Belgium, Denmark, Netherlands, Norway, and Portugal—completed operational testing of the M3 upgrade to their F-16 aircraft last March. The testing was conducted from Oland AB, Norway. Eight lead-aircraft modifications were flown on 268 sorties, an average of more than twelve sorties per day. Approximately thirty percent of the missions were flown at night. The M3 upgrade is a hardware and software follow-on to EPAF’s F-16 Mid-Life Upgrade. Enhancements include Link-16 datalink, helmet-mounted cueing system, and inertial aided munitions, such as the latest GPS-guided precision weapons.

Italian Premier Visits Iraq

Italian Premier Silvio Berlusconi paid a surprise visit to troops at a military base in southern Iraq on 10 April, posing for photos and joining the troops for lunch. The premier traveled in a C-130J flown by a crew from the 46th Air Brigade at Pisa; the visit was conducted in secrecy and under tight security. Some 2,900 Italian armed forces members are based in Nasiriyah, helping reconstruct that city.
TO THE FLIGHT LINE

Newly minted Raptors are towed out of the factory to the south side of Lockheed Martin facilities in Marietta. A yellow line marks most of the route, which cuts across Dobbins AFB. The first stop is a fuel tank flushing facility. The fuel system is flushed ten to twenty times with JP-4 through a range of filters, from coarse to fine. The process once required more than 100 flushes to get a fuel system completely clean, says Nash. "We managed to reduce that to about thirty flushes by changing the cleaning process for the fuel tanks here on the assembly line. We implemented those same procedures for fuel tanks assembled in Fort Worth and Seattle."

Once the fuel system is deemed spotless, the Raptor is loaded with fresh fuel and towed to an engine run station. The aircraft is tied down and the engines are cycled for roughly an hour from idle through afterburner. The auxiliary power unit is tested here as well. The Raptor is now ready to fly.

CUSTOMER CONFIDENCE

The current production run for the F/A-22 is somewhere between 250 and 300 aircraft, depending on who is doing the cost projections. "We can affect our own destiny on the overall production number," says Mike Packer. "We help the cause by being more efficient and producing higher-quality aircraft at lower cost."

Seventy percent of the material, parts, and components come from outside Lockheed Martin, so Packer and his team can generate only a certain amount of savings directly. "But we can identify a lot more by virtue of being the prime contractor," he says. "Suppliers have to gear up their production to support our 9.6-day move rate as well. We are also looking at multiyear procurement approaches that afford suppliers more stability, which in turn lowers prices.

Aside from economic considerations, the Air Force continues to express its confidence in the program. "From the secretary of the Air Force, the chief of staff, and the general officers who are accepting the hardware down to the pilots and maintainers who are using the hardware, all are communicating their satisfaction to us and to our supply base," Packer says. "This builds confidence in the program."

"Every time a Raptor rolls out the door, word comes down the line," says Worley. "Seeing a new one fly for the first time still attracts a crowd. Every time I see a tall number in a photograph, I recall working on that particular aircraft. People care about the program and we all want to do a good job."

Eric Hofs is the editor of Code One.
with the airplane on the assembly line. We make sure that everything is good to go.”

Once the system checks are complete, open panels are closed before the Raptor moves to the final assembly position. Most of the compartments, which will not be opened again before the airplane is delivered, require an okay from a government inspector before the panel is installed. The canopy and radome are the last major components installed before the Raptor rolls off the assembly line. The ACES III ejection seat is the very last major component, and it is installed on the flight line.

The last position is dedicated to the inspection process. “Quality assurance teams are involved throughout the assembly process,” notes Janet Nash, director of quality for the F/A-22. “A government acceptance team in Marietta also participates in inspections throughout the final assembly line and on the flight line. Air Combat Command has a full-time staff here. All of these inspectors are checking holes, measuring locations, and checking paint thickness and surface finishes. Many of these inspection items were established as part of the design process. The lists have been refined as we gain experience with production.”

Once company inspectors have scrutinized the aircraft in Position 1, the Raptor is officially released to a team of government inspectors. “Ten to fifteen government inspectors crawl all over the airplane,” notes Ends. “They write up everything they find. Our goal is for them to find nothing wrong with the airplane. We average only ten to twenty write-ups per aircraft and nearly all of these are relatively minor. We’ve never had an airplane rejected. Fixing all the write-ups for a given aircraft has never required more than two hours.”

More F-2 Components In Work

Mitsubishi Heavy Industries awarded Lockheed Martin a contract valued at more than $130 million on 31 March to manufacture components for six additional F-2 production aircraft. MHI is the prime contractor for the F-2, Japan’s long-range, highly maneuverable support fighter. This new award brings the total aircraft under contract to seventy-one. The company will continue to provide all the aft fuselages, wing leading edge flaps, and store management systems, eighty percent of all left-hand wing boxes, and other avionics and in-flight support equipment. Lockheed Martin components are shipped to MHI’s Komaki-South facility in Nagoya, Japan, where they are assembled by MHI with other components to form the F-2.

I Can See You

Paul Boulagou, chief engineer of Advanced Development Projects at Lockheed Martin Aeronautics Company, has received Design News magazine’s Engineer of the Year award, the publication’s highest honor. Boulagou, who received the award in late February, invented the shaft-driven lift fan and showed how it could be used to design a family of short takeoff/vertical landing and conventional variants of the same aircraft. The counter-rotating fan, mounted horizontally behind the cockpit of the F-35, works automatically with a vectored rear engine nozzle to produce unprecedented lifting force during short takeoffs, vertical landings, and hover. Rolls-Royce, under contract to Pratt & Whitney, is developing the lift fan for all future STOVL F-35s.

Design News Award Goes To Lift Fan Inventor

Icing The Raptor

The F/A-22 recently became the first aircraft to be tested behind a specially modified KC-135 tanker to see how the Raptor performs in rain and ice conditions. The rain and ice tanker is Edwards AFB, California, is fitted with a device similar to a shower head to create a saturated cloud, which results in varying consistencies of rain and ice. Icetests, like those performed with the Raptor, are conducted by flying test aircraft at freezing temperatures. This approach allows the water from the tanker to freeze only when it contacts the aircraft. The effect of the ice on the performance of the F/A-22 was negligible.

The F-35 Joint Strike Fighter team successfully launched the first phase of the F-35 Electro-Optical Distributed Aperture System early risk-reduction flight test program recently at the Naval Air Warfare Center’s Aircraft Division at NAS Patuxent River, Maryland. The next-generation EO DAS, developed by Northrop Grumman Electronic Systems-led team, provides the F-35 with key capabilities that include missile warning, navigation forward-looking infrared, and infrared search and track capability. The flight test program uses a BAC 1-11 flying test bed and captures data using prototype versions of the F-35 DAS sensors. DAS sensors also will be flown in a centerline pod on an F-35 to record data in a dynamic fighter environment.
27th Fighter Wing Wins Colombian Trophy

Injured Afghan Children Airlifted

Eighteen Afghans were carried on an emergency airlift mission to an American medical facility after two improvised explosive devices detonated on 6 January. More than forty-five Afghans were killed or injured in the explosions. Coalition forces used US Air Force HC-130 aircraft on alert from Kandahar AB, Afghanistan, to rapidly transport the most severely injured from the medical facilities at the coalition air base at Kandahar to a field hospital in Bagram AB for advanced life-support care. Twelve of the evacuees were children. The HC-130s were the result of coordination between Combined Joint Task Force-180 forces at Kandahar and Bagram, and the Combined Air Operations Center in Kuwait.

Air Mobility Brings Forces To Haiti

Moroccan Earthquake Relief

After a magnitude 6.4 earthquake struck the Al Hoceima Province in northwestern Morocco on 1 February, a large international relief effort quickly began. The United States joined the relief effort on 28 February when a C-130H crew assigned to the 37th Airlift Squadron at Ramstein AB, Germany, touched down at Nador Airport with four pallets of critical medical supplies and a US European Command Humanitarian Assistance Survey Team. Several hours later, a Utah Air National Guard HC-130H crew arrived with a full load of blankets and additional medical supplies. The Guardian Network is based on a new program that aligns US allies with a particular state, known as the State Partnership Program.

President George W. Bush ordered US Marines into the Republic of Haiti on 26 February. The Marines were the lead element of a multinational peacekeeping force sanctioned by the United Nations after former Haitian President Jean-Bertrand Aristide left office. Active and reserve crews flying C-6, C-141, C-130, and other Air Mobility Command aircraft initially delivered more than 3,000 Marines into Haiti’s capital of Port-au-Prince. As of 5 March, more than 1,200 short tons of cargo had been delivered on thirty-seven missions. The US Coast Guard later supported the Haiti operation by taking a seaport security team and its supplies into Port-au-Prince on board one of its new HC-130 transports.

END: FINAL ASSEMBLY

From the last position in the body mate station, the F/A-22 rises tailfirst and wingless with the help of an overhead crane. The incomplete Raptors, clad in patchwork shades of primer yellow, green, and tan, land a few yards away on a fixture called a tri-dolly, a one-piece movable fixture that attaches to the fuselage at three points. The next time the aircraft leaves the ground, it will be propelled by a pair of Pratt & Whitney F119 engines. The Raptor is now about seven positions and fewer than 100 workdays away from rolling out of the factory.

Any visitor to the Raptor production line, and to the final assembly area in particular, will leave with an increased sensitivity to FOD. Twenty minutes before the end of every shift, mechanics and management stand on the jet on their hands and knees searching for FOD with mirrors and flashlights. Others sweep and vacuum the work spaces. Areas designated FOD-critical require those entering to abide by a FOD dress code—no jewelry and nothing but clothing allowed above the waist.

Loran Bodnar manages the first five positions of the final assembly area (Positions 8 through 4). “I practically live on the floor trying to make that mechanic’s life a little easier. I’m getting the right people out there to answer his questions. We keep busy every day improving the quality of the jet and its assembly process.”

The Raptor spends most of its time in Bodnar’s domain getting all of its flight control surfaces installed and working. The landing gear is the first major component installed after body mate. The wings and vertical stabilizers go on next. They are followed by the horizontal stabilizers, and control surface edges. The ailerons, flaperons, and rudders complete the installation of the control surfaces.

“We install the surfaces and route the hydraulics to them,” says Bodnar, who brought his F-16 production experience to Marietta a few years ago. “We complete all the hydraulic system connections that have to be made after body mate,” he explains. “We Swing the gears for the first time. The aircraft leaves Position 6 on its own landing gear.” Pre-power tests are started in Position 5, where the inlet, aft boom edge, wingtip edge, wing stub edge, and the leading edge flaps are installed. In Position 4, the jet and divertor lip edges, antennae, and main and side weapon bay doors are installed. At this point, all the actuators and hydraulics are working and the jet has full electrical power.

The Pratt & Whitney F119 engines and the Northrop Grumman AN/ALQ-77 radar are installed in Position 3. “We get very heavy into functional testing in Position 2,” notes Scott Ends, who manages the final three positions on the line. “We install all of the avionics. We load software. We test each system individually. We turn everything on. We fire everything up from the radar to the electronic warfare system—all at the same time. We play war games.

TOP PHOTO BY JOHN CARROLL, POPULAR SCIENCE; BOTTOM PHOTO BY JOHN BANNING
The three major fuselage sections come together in Station 5000, which consists of four sequential positions. The aft sections and midsections, delivered to the line from Seattle and Fort Worth, respectively, are painted in Marietta before they arrive at the final assembly line on a flatbed truck. The forward fuselage is loaded by overhead crane onto a precision fixture called a skate. The skate slides forward on rails, allowing space for the aft section and midsection to be loaded behind onto their own skates.

More than seventy-five operations are completed in the first position. The most critical of these involves the precise alignment of the aft and midsection. Laser targets on the wing attachment points or lugs on both the aft and midsection provide alignment data to a computer. Mechanics use computer software to send signals to eight motors under each section to ensure the wing attachment lugs on each section are aligned to each other within thousandths of an inch. Once aligned, more than 750 holes are drilled in the frames, bulkheads, and other structure to join the aft and midsection. The forward section is aligned to the midsection and approximately 1,000 more holes are drilled to join it to the midsection. The entire assembly slides to the second of four positions, where the sections are separated. All of the holes are deburred and cleaned. The sections are then mated with sealant and all fasteners are installed. The next critical operation is drilling out six undersized wing attachment holes on each side of the midsection to precise tolerances within ten to fifteen one-thousandths of an inch. In this second position, the wiring and tubing are run between the sections and attached to the prescribed locations.

Once in the third position, attachment points are drilled for the vertical stabilizers (manufactured in Meridian, Mississippi), horizontal stabilizers (built in Marietta, but which will soon be made by Boeing in Texas), the inlet assemblies (built in Marietta), the landing gear (supplied by BFGoodrich), and control surface edges (made by Lockheed Martin in Palmdale, California). Holes are also drilled for chocking panels that cover the exhaust and mid-forward interfaces. The environmental control system is tested. Wiring connections are checked. Tubing and fuel tanks are pressure tested.

The majority of the drilling and fastening is complete when the assembly reaches the fourth position in Station 5000. The remaining work consists of sealing and pressure testing fuel tanks. The final operations involve completing the remaining functional tests for the environmental control system and cleaning the entire assembly and inspecting it for foreign object debris, or FOD.

"Many of the 300 or so mechanics we have on the final assembly line come from commercial airlines," Angley says. "We have a lot of mechanics from Delta, United, and Northwest. Most of them have excellent mechanical backgrounds. Airline mechanics are more familiar with the tolerances than someone who, say, came from a sheet metal shop. They have an understanding of blueprints, metal work, the tools involved, and the terminologies we use. We're also seeing more experience with composite materials from commercial airline mechanics. All of this experience simplifies training."

Jerry Worley is one of the veteran mechanics on the line. He has worked on the C-141, C-5, and C-130 since coming to Lockheed Martin in Marietta in 1983. He worked on the L-1011, B-1 bomber, and the Space Shuttle in California before that. "I've been everywhere in the Marietta facility from the flight line to final assembly," he says. "The FA-22 is the most different and difficult aircraft I have ever worked on. That's what makes it so much fun. I don't come in every day and drill the same old holes. The job is never boring."

"The various materials, the alloys and composites, keep the work interesting," Worley continues. "The airplane doesn't have flat areas. Every surface is angled or contoured. That affects the drilling process. The working spaces are very compact. We have to be careful with fiber-optic lines. Every operation is precise. We can't tolerate one sloppy hole on that aircraft."

Raptor mechanics take a personal role in making production schedules and achieving quality goals. They track their own work on large charts next to the production line, signing off specific tasks as they are completed. Locations of toolboxes and drill motors are the result of employee suggestions. Mechanics have input into jig designs and tooling setups. Even toolbox arrangements are based on requirements developed by mechanics.

Iron Earthquake Relief
US service members began delivering humanitarian aid to Iran in the wake of a late-December earthquake that left an estimated 25,000 Iranians dead in the city of Bam. Shortly afterward, the US military began deploying more than $100,000 pounds of medical supplies. These were the first US airdrops to land in Iran since the end of the Iranian hostage crisis in 1981. At least seven C-130 Hercules flights went from Kuwait to Kermanshah, the Iranian provincial capital near the affected areas. In addition, a C-5 Galaxy crew from Dover AFB, Delaware, and a C-17 crew from Charleston AFB, South Carolina, delivered personnel, rescue teams, and equipment to Kermanshah.

Operation Niuie Assist
A P-3C crew from the Naval Air Warfare Center Aircraft Division launched, took control of, and recovered a Fire Scout Vertical, comprised of an unmanned aerial vehicle for the first time during a forty-five minute technical demonstration at NAS Pensacola, Florida. A December. The P-3 crew fully controlled the UAV and its sensors, and vectored the Fire Scout to a simulated target where it fed streaming video back. The Orions then relayed the mission video from the Fire Scout, along with video gathered from its own onboard electro-optical sensors, to a ground station. This rebroadcast of sensor data from a UAV to a ground station demonstrated a key networking-communications concept.

Night Riders Deactivated
Shortly after midnight on 3 April, Lt. Col. Dan Gresham, 336th Operations Group chief of special operations at Dover AFB, Delaware, brought the C-5 Special Operations Low Level II mission to a close. The C-5D special operations crew specialized in clandestine operations with night-vision goggles. Some of these SOLL II missions included heavy equipment and personnel airlift and hot refueling of helicopters in forward locations. Although many missions remain secret, the C-5 D SOLL II crews contributed to operations in Saudi Arabia, Desert Shield/Storm, Enforcing Freedom, and Iraq Freedom. The SOLL II mission originated with the C-141 and will now be taken over by C-17 crews.
F-117 Pilots Reach 1,000 Hours

Two pilots both reached the maio of flying hours in the F-117A when they landed at Holloman AFB, New Mexico, on 29 March. Lt. Col. Frank Bogdan, operations director Detachment 1, 53rd Test and Evaluation Group, and Maj. John Markle, assistant operations director for the 7th Combat Training Squadron, were the fourteenth and fifteenth Night Hawk pilots to reach this milestone. Lt. Col. Thomas Stahl, the 417th Weapons Squadron commander, became the sixteenth Night Hawk pilot to join the 1,000-hour club on 27 April at Holloman. Roughly 50 pilots have flown the F-117A, but few reach the thousand-hour mark because they normally serve only one three-year operational tour.

New Boss For DC Guard Wing

When Col. Linda McAlpine assumed command of the 131st Wing, the Washington, DC, Air National Guard unit, on 1 December, she became the first woman to command an ANG wing, and she is believed to be the first woman to command an Air Force fighter squadron. McAlpine began her career as a communications officer and later became an operations support unit pilot before being named executive officer of the 131st Wing. She was also the first woman to command an ANG flying squadron. Approximately 1,050 people are assigned to the 131st Wing, which includes the 211th Fighter Squadron, an F-16 unit, and the 201st Air Refueling Squadron, which flies four aircraft and other duties around the world in a fleet of C-38 and C-40 operational support aircraft.

Celebrating Centennial of Flight

Lt. Col. David Ross, the commander of the 422nd Test and Evaluation Squadron at Holloman AFB, New Mexico, flew an F/A-22 Raptor during a flight over the Centennial Celebration flyby at the Wright Brothers National Memorial near Kitty Hawk, North Carolina, on 16 December, the day before the 100th anniversary of the Wright Brothers' first flight. Maj. Robert Garland flew an F-15 Eagle from Langley AFB, Virginia, and joined in formation over Kitty Hawk. The 27th Fighter Squadron at Langley is slated to be the home of the first operational Raptor squadron and is scheduled to receive its first aircraft later this year.

Promotion At Altitude

Sgt. Personnel had a big day on 15 January. The F-16 pilot from the 510th Expeditionary Fighter Squadron began the day as a first lieutenant, and so was sworn in as a captain while flying at more than 600 miles per hour. The flight, led by Maj. Aaron Stoffel, the wingman, each dropped a GBU-31, and after confirmation the bombs were on target, Stoffels asked, "Are we all present?" Captains Mark Bjergen and Paul Sperl then witnessed Hester's oath of office via the radio. After landing and exiting the jet, Staffs Michael Fanher, 510th EFS commander, met Captain Hester in his flight suit and congratulated him.

BEGINNING: FORWARD FUSELAGE

The forward fuselage of the Raptor takes shape on the left half of the U-shaped production line, beginning with the wheel well and forward fuel tank assembly in Station 8200 and ending with forward fuselage functional checks in Station 6000. The entire process takes about 100 workdays.

The forward fuselage begins as two separate structures, the wheel well/fuel tank assembly and the forward structure that will eventually contain the cockpit. The forward structure is built up on two stations of a short, perpendicular feeder line. It is then slid on tracks onto a turntable that pivots ninety degrees to line it up parallel with the wheel well/fuel tank assembly. The sections are mated in Station 8000. Holes for access doors, panels, and skins are drilled in the mate fixture before the forward fuselage assembly is moved down the rest of the line as a single unit.

Inlet divder skins, cockpit side skins, substructure for the cockpit deck, seatback rails and brackets, arm air manifold, and other major components are installed next (Station 7000). The internal structure of the forward assembly then receives a coat of white epoxy paint before it moves to the last station on the forward fuselage assembly line.

At Station 6000, mechanics install the cockpit center console, avionics racks, and the console assembly, which includes wiring harnesses that connect the cockpit console and displays to all of the aircraft systems. Wiring, fiber optics, tubing, switches, brackets, panels, hoses, ducts, and decals are installed. Functional tests are conducted on fiber optics and the emergency landing gear system. The cockpit is tested for pressure leaks as well.

Before leading to the final assembly line, the forward fuselage is thoroughly inspected and cleaned. It is then loaded in a fixture called a rotisserie and rotated to remove any foreign objects left over from the assembly process. The move to the final assembly line is the first done by overhead crane. Crane moves are kept to a minimum to ensure the structural integrity of the assembly.
Val Retires

The VP-34A utility aircraft at NAS Keflavik, Iceland, nicknamed Nillya, or Val, was used for nearly twenty years to carry more than 22,000 personnel to more than fifteen countries while accomplishing just over 10,000 mishap-free flight hours including 5,675 landings. The VP-34A was retired on 26 January to the Aerospace Maintenance and Regeneration Center at Davis-Monthan AFB, Arizona. Before being stationed at Keflavik, the aircraft had been assigned to VP-30, VP-8, VXN-8, VP-94, and the Naval Aeronautical Support Center in Miami, Florida, from all of its various assignments, the aircraft accumulated 20,108 mishap-free flight hours and was flown more than seven million miles.

Safe Flying

The USAF F-16 fleet exceeded the highest flying safety rate in American Air Force history during the 2003 calendar year with a rate of 1.75 aircraft lost per 100,000 flight hours. The USAF F-16 fleet consists of more than 1,200 aircraft that were flown for 355,000 hours during the year. The F-16 continues to have the best safety record in Air Force history for both multi-role and single-engine fighter categories. Last year, the worldwide F-16 fleet surpassed 11 million flight hours, and the cumulative mishap rates continue to improve as refinements are made to aircraft systems and to operating and maintenance procedures.

S-3 SLAM-ER Shot

While deployed to NAS Fallon, Nevada, earlier this year, S-3 and S-3A crews from VS-32 and VFA-82 aboard the USS Enterprise (CVN-65) cooperated for the first AGM-84K Standoff Land Attack Missile-Expanded Response missile firing using airborne targeting systems to strike a target that had not been preprogrammed on 6 May. All targeting information was received in flight via datalink. This shot marked the first SLAM-ER live fire event controlled by a fleet S-3B. The target was a simulated surface-to-air missile re-locator site hosted on the Naval Air Warfare Center Weapons Division Sea Target Range off the California coast.

Red Tail F-16

The 187th Fighter Wing at Dannelly Air National Guard Base in Montgomery, Alabama, paid tribute to the Tuskegee Airmen by painting one of its F-16s in the same color scheme as the original Tuskegee Airmen aircraft. The unit hosted three of the original Tuskegee Airmen in April as part of a Guard diversity program. The group included Gen. Daniel "Chappie" James, Jr., who was a member of the original Tuskegee Airmen class.
CHANGING MINDSET

The F/A-22 assembly line is being transformed as F/A-22 manufacturing ramps up from eleven aircraft in 2003 to nineteen aircraft in 2004 and add to a final assembly of thirty-two aircraft in 2007. "To paraphrase Winston Churchill, we are not at the beginning of the end, but at the end of the beginning," says Terry Lusk, the president for F/A-22 production and material operations at Marietta.

"Production requires a different mindset from development," Lusk continues. "In development, I can tell mechanics I need to change something and they can make it work. In production, we have to develop a process for addressing the change in subsequent and existing aircraft. That process must be both efficient and repetitive. We have to specify every task within the production process in detail. We have to make sure everything comes together at the right time and at the right place."

Increasing the rate also highlights inefficiencies in any production line, especially one as sophisticated as the F/A-22 line. "We were focusing on shakedown during the tooling when we were working at lower production rates," notes Mike Packer, the director of F/A-22 manufacturing in Marietta. "We have to standardize the assembly process to improve efficiency. We're pressed over the last year and a half to fill up every position on the line, maintaining a throughput on a strict cadence reveals obstacles to production."

That throughput, for 2004, equates to one F/A-22 rolling out of the factory every 9.6 days. One complete aircraft rolling out makes room for all the work in line and fill up one position. Ideally, every position on the entire line moves in this one-day drumbeat.

As the drumbeat increases over the coming years, employees have to work smarter. "We have to become more efficient since we can get only so many people to work around an assembly," says Mark McDonald, senior manager of production affordability. "We become more efficient by minimizing design changes and by listening to the mechanics assembling the airplane. Working smarter can mean reorganizing work flows, designing a new tool to simplify a task, or adding a run station on the flight line."

Many of the recent changes are paying off. "We had as many as six months waiting to be mate a year ago," says Charles Baggett, director of major assembly. "Now when a mishap is shipped from Fort Worth, it arrives just in time for fuselage mate. The overall span time from loading the first bulkhead to moving out the door was sixteen months for Ship 29, which was rolled out of final assembly in 2004. That goes down to one year for Ship 53, which will be shipped in early 2005. So the span goes down significantly in the coming year."

FLIGHTING TOLERANCES

F/A-22 assembly takes place in the southwest corner of the large B-1 manufacturing building in Marietta. B-1 encompasses 3.5 million square feet, of which the Raptor assembly area occupies 240,000 square feet. The F/A-22 production area is physically divided into two parallel lines, forward fuselage assembly and final assembly.

The overall production tasks assigned to Marietta can be traced back to the original three-company teaming agreement for the Advanced Tactical Fighter. That agreement cut the aircraft into sections, with Boeing building the wings and aft section in Seattle, Washington; General Dynamics (now Lockheed Martin Aeronautics Company) in Fort Worth building the midsection; and Lockheed (now also Lockheed Martin Aeronautics Company) building the forward fuselage, performing final assembly, and conducting flight tests in Marietta.

Both the forward fuselage and final assembly lines have split-level stations. Upper and lower decks allow crews of mechanics to work above and below assemblies simultaneously. Supplemental lighting, reflected by shiny white epoxy-painted floors, keeps the work area well illuminated. The line is relatively quiet thanks to a recently installed utility tunnel that brings power, compressed air, water, and hydraulic fluid to the line. Assemblies move from one station to the next on rail systems for much of the line. Workers use laser theodolites and mechanical alignment tools at various locations to verify tolerances measured to one-thousandth of an inch in some cases.

"Interchangeability drives a lot of our tolerance requirements," explains David Trawinski, director of production engineering for F/A-22. "Maintainers in the field have to be able to replace one panel with another panel and not worry about trimming the new panel to fit. Low-observable requirements drive some of these tolerances as well." Trawinski is in charge of making rapid engineering changes on the production line. "I deal with discrepancies on the line," he says. "For example, if someone trims a part too much, say by thirty-thousandths of an inch, I'll have to replace the part for them to fit. We get that part quickly to keep the line moving. We also take immediate corrective actions so we don't repeat mistakes."

F-16 Production Quality Record

In 2003, F-16 production at Lockheed Martin's Fort Worth plant achieved a new record in quality of newly delivered aircraft. During extensive shipping inspections, which usually last a week for each aircraft at the initial base of assignment, the average number of discrepancies found was 0.75 per delivered aircraft. This compares very favorably with the 1.5 rate for the previous year and the 2003 goal of 5.0 aircraft. The defect rate has continued to improve over the last five years. In addition, fifty percent of the aircraft had zero defects in the 2003 inspections.

Every F/A-22 Raptor begins as an aluminum bulkhead loaded into a fixture for early final assembly. The aircraft is then test run on a production line in the Aseco building. A clock starts ticking at 8200. The numerical designation of the first forward fuselage assembly station, the station designations count down to position 3. As the aircraft travels from raw metal into a fully functioning F/A-22.
Little Rock Displays RB-57

The 314th Operations Squadron, with support from several other units at Little Rock AFB, Arkansas, moved a piece of history 22 March as an RB-57 Canberra was relocated to its new home in Heritage Park. The RB-57 served as a light bomber and reconnaissance aircraft during the Cold War and in Vietnam. Fourteen RB-57 aircraft were assigned to Little Rock as early as the 1950s as part of the Arkansas Air National Guard’s 189th Tactical Reconnaissance Squadron.

Hercules Fuselage Fuel Tank Delivered

Aero Union, a daughter of special missions aerospace equipment, delivered the first 3,600-gallon fuselage fuel tank system for the C-130 Hercules in early February. The tank system will be installed on a Royal Malaysian Air Force C-130H as part of a transport-to-tanker conversion contract. The 3,600-gallon tank is a cruised-rated system that weighs 2,260 pounds and is used extensively in the KC-130 Hercules tankers operated by the US Marine Corps and several other tactical air tanker operators. Aero Union also produces the C-130 twin 1,800-gallon tank system, which has been in use by the air forces of Australia, Israel, Morocco, and the United States for many years.

New Software Makes Life Easier For F/A-22 Team

The 43rd Fighter Squadron, the Raptor schoolhouse at Tyndall AFB, Florida, will soon be using a new automatic computer software tracking program that checks the progress of F/A-22 students, what stage of training they have completed, and what is scheduled for them next. At the heart of the new system, called the Combat Crew Training Management System, is a room housing two interactive white boards, an active plasma display, a bank of computers, flight scheduler function, and data operator. One of the features of the system is that it automatically notes if a pilot needs to reschedule a flight or a simulation training session.

313 Squadron Celebrates Fifty

The Royal Netherlands Air Force 313 Squadron celebrated its fifty-year anniversary at Twenthe AB in April. More than 600 guests attended a reunion and were entertained by various demonstrations from the base’s fire department, weapons crew, and aircraft static display. The highlight of the afternoon was a flight by the RNLF F-16 demonstration team, which flew an F-16 with special tiger markings for the occasion.

Taco Leader Retires

Col. William F. Robinson, the vice wing commander of the 150th Fighter Wing of the New Mexico Air National Guard at Kirtland AFB, retired in January after serving thirty-four years in the Air Force. Robinson accumulated more than 7,000 hours in F-4C/D/E, F-15A, A-7D, and F-16C/D fighter aircraft, including more than 113 combat hours in F-4s over Southeast Asia. He also flew F-16 combat sorties in Bosnia and over Iraq in support of operations Northern Watch and Southern Watch. As a fighter pilot and leader for the New Mexico ANG, Robinson accumulated more than 2,200 hours in the F-16.
Steady As She Goes

MILITARY

Milt, Mark Dupree, the 56th Air Mobility Squadron mission support team chief, gives a thumbs-up as an HH-60G Pave Hawk helicopter, belonging to the 56th Rescue Squadron, is unrolled from a Westover ANG, Massachusetts-based C-5A Galaxy at Ramstein AB, Germany, last March. The 56th RQS, based at Nellis AFB, Nevada, comes to Ramstein to train with the 86th Contingency Response Group on combined search and rescue operations. The two groups performed a real-world evacuation of American Embassy personnel in Liberia in July 2003 and got back together to refine operations.

Hercules On Display

A Pepe AFRL, North Carolina-based C-130E Hercules retired from active duty on 2 February, with its crew making the aircraft's final flight to the Air Mobility Command Museum at Dover AFB, Delaware. Lt. Col. Jeff Brown, the 23rd Airlift Squadron director of operations, flew the aircraft to the museum. Col. Frank Lanas, the 43rd Airlift Wing vice commander, was the mission commander. Built in 1970, the Pepe C-130 will become part of the museum's display honoring the air mobility contribution to the armed forces throughout American history. The Dover museum is the only museum dedicated to the preservation of military history and tanker history.

Big Drug Bust

A Royal New Zealand Air Force P-3K Orion crew located two suspect dhows in the Arabian Sea on 18 December. Patrol aircraft from Australia, United Kingdom, and the United States then tracked the dhows for the next forty-eight hours. With a Royal Air Force Nimrod patrolling overhead, the USN Philippine Sea (CG-58) intercepted the boats on 20 December. Approximately 150 pounds of methamphetamine were found on the first dhow. Meanwhile, the second dhow attempted to escape. A US Navy P-8A Orion crew videotaped that crew throwing approximately 200 bags overboard while they fled. The second dhow was caught, and one fifty-pound bag and one thirty-five-pound bag of what is believed to be pure heroin were discovered.
### NOTAMS

**Going Into A Hero...**

Airmen from the 407th Expeditionary Logistics Regiment's Resilient Squadron lead generators for RQ-4 Predator unmanned aerial vehicles onto a C-130 Hercules as the sun sets at Balad Air Base, Iraq.

**Photographers Meet**

The fourth annual International Symposium for Aviation Photography, hosted by Netal AFB in March, was a huge success. Code One sends a special thanks to all the photographers and attendees.

**C-130 History Published**

The third edition of *Herc: Hero of the Skies*, regarded as one of the definitive histories of the C-130, was published in December by Brigitte Books in Fairview, North Carolina. The new expanded edition brings the history of the Hercules to the present day and includes the story of the rescue of Dr. Jerri Nielsen from Antarctica and development of the C-130.

**F-16 Book Update**


**Unmanned F-35**

Michael McCaffrey plans to fly his own K-35C this spring. This radio-controlled version of the Navy's F-35 prototype is powered by an alcohol-fueled ducted fan engine. See http://home.att.net/~mccaffrey/mk35c.htm.

**Loading A JDAIM**

Sgt. Lucas Williamson and Sgt. James Smith, both with the 510th Expeditionary Fighter Squadron, load a JDAM precision-guided munition onto an F-15E Fighting Falcon at a forward-deployed location in Southwest Asia in mid-January.

**Loading Up**

Pilots and crew of the Army's 82nd Airborne Division prepare to board a C-130 during Operation All-American Lighting near Al Asad AB, Iraq, last February. All-American Lighting is a joint US Air Force and Army exercise designed to demonstrate military capabilities in a forward-deployed environment.

### Subscription Incentive

This quarter we are giving away Operation Iraqi Freedom lithographs signed by the artist Price Reded to the first twenty new subscribers. A cropped version of the painting was used as a backdrop for the first quarter 2004 edition of the Code One Internet site. For those who want a chance to win one of ten posters without subscribing, send your name, address, and telephone number to Code One/Postal Serviceway/ PO Box 748/Mold Zone 1500/ Fort Worth, TX 76101. Entries must be received before 1 August 2004.

### The Best Of Care

Col. Charles Meyer checks the medical charts of a wounded service member being transported from Iraq to Landstuhl Regional Medical Center in Germany on a C-141 StarLifter. Meyer heads a Critical Care Aeromedical Transport Team, which has special training in managing patients in less-than-ideal patient-care environments. The team consists of Guard and Reserve members assigned to the 73rd Expeditionary Aeromedical Squadron, based at Ramstein AB, Germany.

### Power Up

An S-3B Viking pilot gets the signal to increase engine power prior to a catapult launch from the USS Kitty Hawk (CV-63), while the carrier, known as the Battle Cat, is under way in the Pacific Ocean in late February.