F/A-22 Operational Testing
Airlift Tactical Training
F-16 Block 60 Arrival
U-2 Anniversary
The maiden flight of the U-2 came fifty years ago. Today, the Dragon Lady continues to provide unmatched capabilities as the backbone of airborne intelligence collection for the United States. See related article on page 26.
ANY AIRSPACE, ANY SITUATION
422nd Test And Evaluation Squadron Defines The Raptor

CLOSE TO COMBAT
Advanced Tactics Training For Airlift Crews

SUNRISE, SUNSET
C-141 Evac Mission Continues, C-5 Coming At Wright-Patterson

BLOCK 60 ARRIVES IN UAE
Desert Falcons Find Their New Home

FIFTY YEARS OF HIGH-FLYING SURVEILLANCE
U-2 Celebrates Half A Century

AIR MOBILITY RODEO 2005
Airlifters Meet And Compete At McChord

EVENTS
“WE JOKE ABOUT OUR MISSIONS AGAINST THE RAPTOR BECAUSE THEY CAN BE FAIRLY BORING. WE FLY TO THE RANGE. DIE. GO TO THE TANKER. GO BACK OUT. DIE. GO BACK TO THE TANKER. GO BACK OUT. DIE A THIRD TIME. THEN WE GO HOME,” SAYS LT. COL. PAUL HUFFMAN, THE COMMANDER OF THE 64TH AGGRESSOR SQUADRON AT NELLIS AFB, NEVADA, WHO HAS FLOWN AS AN ADVERSARY AGAINST THE F/A-22 MORE THAN TWENTY TIMES.

“If anyone has a view from an adversary’s perspective of what this airplane can do, it has to be us,” Huffman adds. “During Initial Operational Test and Evaluation last year, we rarely saw an F/A-22, let alone got a shot at one. From our perspective, the airplane certainly performed better than expected. The F/A-22 is transformational, no doubt about it.”

The 64th flew almost 300 sorties against F/A-22 operational test pilots of the 31st Test and Evaluation Squadron based at Edwards AFB, California, during IOT&E last year. “We never got to a merge against a single F/A-22 during IOT&E,” Huffman continues.

The 64th Aggressors are well known, as they provide adversary support for Red Flag and other large-scale exercises held at Nellis. Pilots of the 64th
use F-16s camouflaged in blue and brown to replicate aircraft, weapons, and tactics employed by potential threats. "We have the experience and knowledge and that’s why the Air Force asked our unit to fly against the F/A-22 in IOT&E," Huffman adds. "We flew in every IOT&E mission. We also flew against Raptor pilots in the air combat simulator in Marietta, Georgia."

Many of the IOT&E missions lasted more than three hours and included several engagements. Two F/A-22 pilots often flew against four F-16s from the 64th. Raptor pilots performed pre-strike sweeps, defensive counter-air missions, and surge operations. The sweeps involved clearing a given airspace for attacking aircraft (F-16s, F-15Es, and other bomb-carrying assets). The defensive counter-air missions involved defending a point or airfield against attacking aircraft. Surges involved producing a certain number of sorties in a prescribed period of time.

Today, operational testing of the Raptor continues with the 422nd Test and Evaluation Squadron at Nellis AFB.

Lt. Col. Robert Garland, a former F-15C pilot who flies Raptors with the 422nd, provides an F/A-22 perspective on air-to-air combat in the Air Force’s most advanced fighter:

“Six adversaries provide a good workout for two F-15C pilots,” he says. "But for two Raptor pilots, defeating six adversaries is about as difficult as eating breakfast. We don’t even break a sweat. The Raptor needs a lot of adversaries to create a challenge.”

IOT&E Defined
Every new weapon system the Air Force acquires must be formally evaluated before the system enters full-rate production. The tests are overseen by an independent agency—the Air Force Operational Test and Evaluation Center located at Kirtland AFB, New Mexico. The results are reported to the Office of the Secretary of Defense and to Congress. The report includes a pass or fail grade for both the operational effectiveness and the suitability of the weapon system.

During the operational effectiveness testing portion of the F/A-22 IOT&E, Air Force pilots flew as many as four F/A-22s in a variety of simulated combat scenarios. Five different F/A-22s were flown in the tests, which accounted for more than 500 missions and about 1,300 total flying hours. During suitability testing, the Raptor was appraised for how easily it can be deployed and maintained. The testing involved dozens of Air Force maintainers and other support personnel from Air Combat Command. Flights originated from Nellis and from Edwards AFB, California.

Lt. Col. Art McGettrick, commander of the 422nd TES, is one of seven USAF pilots who flew the Raptor in those IOT&E missions at Edwards AFB. "I arrived at Nellis from Edwards in October 2004 after wrapping up the IOT&E report," he notes. "I can say the effectiveness tests were a resounding success overall, though details of the report are classified at a high level to protect the capabilities of the airplane.

“The results looked positive for suitability as well,” continues McGettrick. “But we didn’t have a chance to address all the suitability criteria since they were based on initial operational capability for the F/A-22, the date the aircraft is declared ready for operational service, which is scheduled for December 2005. In other words, we could not meet criteria set for capabilities the aircraft did not yet have. We gave the Raptor a score of ‘effective and potentially suitable.’ The suitability score generated attention from officials looking for a pass or fail.”

Follow-On Testing
The next series of tests, called follow-on test and evaluation or FOT&E, is designed to settle that score. “FOT&E was added to address untested items and to validate fixes to problems found in IOT&E,” McGettrick explains. “However, our primary focus for FOT&E is the Raptor’s air-to-ground capability.”

The Raptor’s initial air-to-ground capability centers on the 1,000-pound GBU-32 joint direct attack munition, or JDAM. The F/A-22 can carry two of these precision-guided bombs in the main weapon bays. The software
required to drop JDAM, not available for IOT&E, was loaded onto Raptors at the 422nd in early 2005.

The 422nd will perform three primary mission types during FOT&E: surface attack, strategic attack, and retargeting. "For FOT&E, we fly to the northern range with the aircraft in an air-to-ground configuration," explains Maj. Orlando Sanchez, the F/A-22 division commander at the 422nd who is also involved in planning the tests. "We either simulate JDAMs or carry actual JDAMs on board. For surface attack missions, we go against a force of adversaries and try to hit targets inside simulated surface-to-air missile engagement zones. For strategic attack missions, we hit higher value
and more heavily defended targets. For retargeting missions, we sit out on a tanker and wait to get tasked. Once tasked for the mission, we program the JDAMs for the unplanned target.”

The FOT&E missions include about seven live missile shots and approximately twenty live JDAM drops. Pilots and official observers critique the aircraft’s performance and score and grade each mission accordingly. During the mission, data is recorded on the aircraft by an instrumentation data acquisition package, or IDAP—a large orange box carried on the right side of the main weapon bay. “We generate a mountain of data, which is analyzed by a team of engineers,” Sanchez says. “The aircraft has to meet a large set of criteria before we can classify a mission successful.”

Operational test pilots at the 422nd have already gained some initial, positive experience with the JDAM. “Our first air-to-ground missions were eye-opening,” explains Garland. “We know what this weapon is designed to do, but combining it with the capabilities of the Raptor creates some additional advantages. We can drop JDAMs deep within a heavily guarded area and escape undetected. We can drop JDAMs from longer ranges, from outside a radar threat ring, and make ground attacks safer. The Raptor is the only platform that can use the JDAM like this.”

**Dominating The Battlespace**

Air-to-ground capability transforms the F/A-22. Pilots at the 422nd use the term *battlespace dominance* to denote the transformation. “The F/A-22 has evolved from an air superiority platform, like the F-15C, and from a strike asset, like the F-16 or F-15E, to a weapon system that can dominate the battlespace,” explains Garland, who accumulated more than 2,000 hours in the F-15C Eagle. His Eagle experience includes a four-year stint as an instructor in the Air Force Weapons School at Nellis.

“We knock down air threats in an F-15C to pave the way for the strike assets,” he continues. “The F-15’s radar cross section forces us to stop pursuing aerial targets when we encounter a SAM threat. The Raptor’s stealth, on the other hand, allows us to run down those targets and destroy them. We can also drop bombs on those SAM threats or on any other target.
“With our global strike concept, we can attack anything in the air and sanitize a battlespace.” — Lt. Col. Robert Garland

With our global strike concept, we can attack anything in the air and sanitize a battlespace. When I am out of missiles to shoot and bombs to drop, I can continue to support the fight with my integrated avionics by flying as a sensor platform and using my data link to project everything the airplane can see to other assets in the area and to the leadership back at headquarters.”

Pilots and personnel at the 422nd play an important part in capitalizing on the potential of the F/A-22 as part of this global strike concept. “The term global strike, which refers to the integration of the low-observable assets into a strike package, has been around long before the Raptor showed up,” notes Sanchez. “The B-2 and the F-117 have been working together for a while. The F/A-22, however, rounds out the full complement of aircraft needed to implement the concept. Each aircraft has unique capabilities,” continues Sanchez. “Together they add up to a force that can penetrate and destroy highly sophisticated integrated air defense networks. The vision General [John] Jumper [Air Force Chief of Staff] laid out for global strike is a ‘kick down the door’ force, a collection of air assets that locate and destroy targets in a heavily defended country. The Raptor brings a highly effective air-to-ground capability to that mission as well as an offensive air-to-air capability.”

Sanchez and other F/A-22 pilots have flown actual global strike missions at Nellis in recent weeks, including a night mission with three B-2s, four F-117s, two Raptors, three EA-6B jammers, and a tanker aircraft going against six aggressor aircraft and a SAM threat. “We took out the aerial threat, and then defended the F-117 and the B-2 against the SAM sites,” explains Sanchez. “We can use the Raptor to attack high threat areas with precision munitions and then fight our way back out—with or without support,” adds McGettrick. “Any airspace, any situation. That’s what the Raptor brings to the table.”

Beyond The Four Pillars

Anyone associated with the F/A-22 program can cite the strengths of the aircraft in terms of four primary capabilities: maneuverability, supercruise, stealth, and sensor fusion. Each capability is fairly easy to describe independently. Explaining the interrelations that
make the Raptor superior to every other fighter that preceded it, however, is trickier. Firsthand experience from the cockpit helps.

"The combination of stealth and supercruise reduces the range of a defensive system more than it would be reduced by stealth or speed alone," explains Maj. Alexus Grynkewich, chief of F/A-22 standards evaluation at the 422nd. "At subsonic speeds, the Raptor would not offer any real advantage over an F-117 in terms of stealth. At supersonic speeds, the Raptor is already out of range by the time a radar system might see it."

According to Grynkewich, the combination of maneuverability and speed offers another example of a combination advantage. "People typically think maneuverability is getting down to a slow-speed dogfight," he says. "We don’t expect to get slow with the F/A-22. We will be flying at high speeds and high altitudes, taking long-range shots with air-to-air missiles or precision-guided munitions. The maneuverability provided by the aircraft’s thrust vectoring is useful at these high altitudes where the air is so thin that the control surfaces, the flaps and ailerons, are less effective. Thrust vectoring allows us to make turns at those altitudes to get in the best position to launch weapons and escape detection."

**Pilots And Maintainers**

Eight F/A-22s will populate the ramp at the 422nd when FOT&E spins up in late summer 2005. Ten pilots will be assigned to the Raptors. About half of them come from the F-15C and the other half from the F-16 and F-15E. Six of the pilots are graduates of the USAF Weapons School and one is a graduate from Test Pilot School.

"We will soon get an F-117 pilot as well," notes McGettrick. "He will bring several generations of experience in maximizing stealth. The F-117 community has been doing stealthy air-to-ground attack for twenty years now. We’ve been doing air-to-ground attacks for about four months in the F/A-22. We think the F-117 experience will be beneficial."

"At supersonic speeds, the Raptor is already out of range by the time a radar system might see it." – Maj. Alexus Grynkewich
The aircraft are maintained by about 120 maintenance personnel of the 57th Maintenance Group, which falls under the command of the 57th Wing at Nellis. The 422nd TES falls under the 53rd Test and Evaluation Group, which is part of the 53rd Wing based at Eglin AFB, Florida. Though the 57th is getting some maintainers straight out of technical school, most have transitioned to the F/A-22 from other aircraft.

SSgt. Chris McLean, a Raptor crew chief, brings more than eight years of F-15 experience to the F/A-22. “The transition is like starting over,” he says, “because the Raptor is a totally different airplane. Just getting comfortable with an airplane takes about six weeks for someone with experience.” The portable maintenance aid, or PMA, accounts for most of that learning curve according to McLean. Ground crews use the ruggedized laptops to launch the F/A-22, to fuel it, to rig its flight controls, and to consult for almost every maintenance task.

“We don’t use paper forms or technical orders,” says McLean. “All the information we need is right there in the laptop. If I needed to pull a starter in an F-15, I had to look up the technical order number and determine which book of which volume contained the information I needed. Then I had to check out the technical orders at the support section and lug all of the books back to the flight line. With the F/A-22, I just determine what category the starter is in on my laptop and then click on that category. The tech data appears on the screen. I go to the jet with only my toolbox and my PMA.”

In his almost three years of experience maintaining the F/A-22, McLean is impressed with the progress he has seen. “The recent aircraft
“The Raptor is more stable and more reliable. We recently flew thirty-three sorties without one ground abort.” — SSgt. Chris McLean
modifications have been great improvements,” he notes. “The software loads are making the jet better as well. The Raptor is more stable and more reliable. We recently flew thirty-three sorties without one ground abort.”

Sgt. Gaylon Simmons, a weapons expeditor for the F/A-22 at Nellis, has been similarly pleased with the Raptor. “Loading an AIM-120 on the aircraft is extremely easy,” he says. “We simply attach each missile to two sets of hooks, front and back. We don’t have to line up the angles like we do on other aircraft. On an F-16, for example, the tilt and roll angle has to be perfect before we can slide a missile on the rail. On the Raptor, the missile attaches and slides right on.”

Wringing out software and hardware improvements falls under the heading of force development evaluation, which is performed separately from IOT&E and FOT&E. While IOT&E and FOT&E are government-mandated and overseen by the Air Force Operational and Test Center, FDE is directed by Air Combat Command and implemented by the 53rd Wing.

“Our work on FDE informs the F/A-22 tactics manual,” notes Garland. “We also write academics describing each system on the airplane. If we’re writing about the radar, for example, a pilot from the 422nd assigned to the radar writes a term paper describing how the radar functions. To gain more information about the radar, he works with the various contractors who designed and built the radar. Once the paper is completed, the pilot teaches F/A-22 operators at Langley everything he learned about the radar.”

The 422nd also has experts who specialize in tactical topics, such as basic fighter maneuvering, air combat maneuvers, tactical intercepts, dissimilar air combat training, and defensive counter-air. Every Raptor pilot at the 422nd specializes in at least one particular system and in one or more tactics.

“Like our other aircraft at the 422nd, the Raptor will continue to evolve,” says McGettrick. “We will be leapfrogging between FOT&E and FDE for the F/A-22 in the coming years as we develop specific tactics for global strike and conduct specific test programs for tactics associated with new capabilities, such as the panoramic night vision goggles.” The 422nd will conduct tests on every planned improvement before those improvements are fielded in the operational fleet.

“We are still writing the tactics and the tech orders, still getting new software,” McGettrick continues. “Testing and evolving the F/A-22 is a monumental task for everyone involved—from the contractor, to the officials associated with it, to the pilots, to the maintainers. But it’s a labor of love. We’ve all seen what the F/A-22 can do. The airplane is ninety percent there. No major obstacles remain. We are here to make this fighter live up to its potential and to prove to our country’s leadership and to US taxpayers that they have made a good investment. I have no doubt we will succeed.”

Eric Hehs is the editor of Code One.
It had not been an easy mission so far. The C-130 Hercules crew had confounded the anti-aircraft gunners at the combat entry point by “hunkering down and slicing through”—maneuvers that defy convention in order to disrupt the gunner’s aim. Minutes later, a timely dispensing of flares and rapidly changing altitude, speed, and direction had allowed the crew to defeat another threat by avoiding an insurgent’s shoulder-fired, surface-to-air missile.

The Hercules pilot knew the enemy fighter pilot now chasing him was already out of his comfort zone. His adversary was probably just about out of fuel—fighters always get short on fuel when they maneuver. Keeping him at low altitude in this mountain valley and at the speeds the C-130 normally flies, the pilot of that fast mover would probably get frustrated and leave. The transport pilot had to keep the fighter at arm’s length for just a few minutes to survive the encounter.

After the fighter left, the Hercules pilot, with crew, cargo, and paratroopers intact, realized the specialized training he received and the coordination the crew had practiced really did work. Now all the crew had to do was hit the time on target for the airdrop, fly another ten minutes, make an assault landing, and return to friendly territory.

This mission is not actual combat, but very close to it. It is the graduation sortie of a grueling nine-day flying training course taught by the Advanced Airlift Tactics Training Center, AATTC.

The setting is the mountains of Arizona, but most of the events that take place on this flight could have happened in the mountains of Afghanistan or Iraq. Although close-in air-to-air engagements have not occurred since the Vietnam War, they certainly could in many other hot spots around the world. Crews have to be prepared.

“We are always told that we don’t stand a chance against SAMs and fighters in a Hercules,” says MSgt. Hector Garcia, a C-130 loadmaster with the 198th Airlift Squadron, the Puerto Rico Air National Guard unit based at Muñoz ANGB in San Juan. “After taking this course, we see that we really do have a chance. We are not just a sitting duck.”
**MASTERS DEGREE**

“We show airlift crews they can survive,” says Col. Michael Pankau, AATTC commander. “We give them their master’s degree in combat tactics. Red Flag is a doctorate-level exercise.”

Red Flag, held regularly at Nellis AFB, Nevada, is the most realistic simulated war training exercise ever developed. “After our C-130s went to Red Flag in 1980 and got their butts kicked, the need for a tactics course for airlifters became painfully obvious,” explains Pankau.

Test classes in 1982 and 1983 led to the first formal C-130 tactics courses a year later. Since then, more than 1,500 aircrews have been trained at AATTC, a joint Air National Guard and Air Force Reserve Command, or AFRC, operation. The students come from every US Air Force major command, the Guard, and AFRC, as well as from the US Army, Navy, and Marine Corps.

But the aircrew course is not limited to C-130, KC-130, C-17, and now C-130J crews from the United States. Eleven international countries have sent C-130, C-130J, C-160, G.222, and CASA 295 crews to AATTC. “The German Air Force considers this course a requirement for its crews to be fully combat qualified,” says Lt. Col. Darrin Sloan, an AATTC instructor pilot who was the session commander for a recent class. “We are proud of that endorsement, which is a measure of respect.”

The aircrew course is constantly changing because the nature of tactics is always evolving. “In the past, we used a scenario based on a conflict between Chad and Libya, but now we are using a scenario more in step with the situations in Afghanistan and Iraq,” notes Lt. Col. Jose Rivera-Rivera, the center’s chief of intelligence.

“We have instructors who go to the Middle East and work in the Combined Air Operations Center in Kuwait,” says Maj. Eric Thompson, an instructor navigator. “They bring back what they learn, and we incorporate it into the training.” Every detail is considered. For example, AATTC changed its in-house flight planning form to the flight planning form used in Iraq. “We strive for as much realism as possible,” says Thompson.

**MISSOURI SCHOOLHOUSE**

The aircrew course runs from Saturday to Saturday. The first few days are spent at Rosecrans Memorial Airport in Saint Joseph, Missouri. “The crews going through the course are experienced. They are screened before they get here,” notes Pankau, “and we get a summary of their flying skills to know what to emphasize during the course.”

Typically, each class consists of three or four crews. Class 05-009 held in May featured three different C-130 models. The 198th Airlift Squadron crew operated a 1962-vintage C-130E; that aircraft shared the ramp with a 1980s-era Marine Corps KC-130T tanker and an early 1970s C-130H from the Belgian Air Force equipped with an upgraded digital cockpit. “We teach crews to use what they have,” says Capt. Tom Kroh, an AATTC weapons instructor.

The first two days of the course are spent in the lecture hall in the AATTC schoolhouse, a 12,500-square-foot building constructed in 1996. The crews receive academic instruction on topics such as worldwide airlift operations, low-level dynamics, visual illusions, aircraft structures, tactical formations, and infrared defensive systems.

“The crews need to have the mindset that this is one step from combat,” says Maj. Gerald DePastino, an instructor navigator. “They also need to prepare the aircraft to go into combat.” Preparations include taping the galley drawers shut, taping down the aircraft technical publications, and securing the crew parachutes, as these items

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become projectiles when a crew is maneuvering aggressively to avoid an incoming threat.

Preparation also includes installing a clear observer’s bubble in the C-130’s emergency hatch on the roof of the flight deck. This blister is only large enough to accommodate the head of the second loadmaster on an augmented crew. The bubble is cramped and hot, and the odd sensory inputs from looking out of it often induce nausea. But the bubble is invaluable in combat, as it gives the loadmaster serving as an observer a 360-degree view of the airspace around the aircraft.

The first C-130J crew was trained in 2002. “The C-130J crews also use the bubble,” says Lt. Col. Roger Olson, AATTC’s assistant director of operations. “We encourage the C-130J crews to bring an additional loadmaster precisely to provide visual coverage around the aircraft. The aircraft’s onboard systems work well, and the visual scan adds another layer of awareness.”

The other loadmaster also becomes an observer, strapping in and looking out the paratroop door window on the right side of the airlifter. Newer C-130s have a folding stool on the paratroop doors for the loadmaster. On older aircraft, loadmasters often come up with an improvised harness. They need it—the ride gets bumpy.

**CRAWL, WALK, RUN**

“The basic philosophy of this course is to crawl, walk, then run,” says DePastino. “The ultimate goal is to survive and carry out the mission.”

Crews are given a time limit on mission planning that gets shorter as the course progresses. The limit gets crews to break up the planning tasks at first. As they become more proficient in planning and better at working together, they have less time to prepare. The time limit is also a reflection of combat, where time is often not a luxury.

“We tell the crews to use every tool in their toolbox,” says Capt. Greg Stewart, another instructor pilot. “We remind them to use the terrain as much as possible to hide behind or to drag the aircraft’s shadow through patches of vegetation to avoid being seen by fighters. A single ship maneuvering and using terrain adds up to a significant advantage.”

“We don’t want to overload the crews on the first day,” continues DePastino. “So the first mission just exposes them to antiaircraft artillery.” AAA firing is simulated with a center technician using a signal mirror as the crew flies a low-level route over the relatively flat Missouri terrain. The crew has to maneuver aggressively to make the AAA shooter work to create both a lead and an elevation firing solution. AAA and man-portable missiles usually work together, so it is important for the crew to release flares.

On all training flights, one of the instructors is either standing behind or strapped in behind the pilot. He is looking for how well the crew navigates the route and maintains altitude and how timely they are reaching the drop zone. “We will mess with the crews during the flight by creating emergencies or changing the threats,” says DePastino. “Mainly, we want them to learn to exchange information.”

The second flight adds formation flight and communications practice with an escort fighter, usually an AFRC A-10 from Whiteman AFB, Missouri. “The A-10s are comfortable at our altitudes, with energy closer to that of a C-130 in the turns,” says Kroh. “Like the C-130s, the A-10s fly low and slow. They also have the guns. They make good wingmen.”

In addition to avoiding AAA, the crews also get their first exposure to Smokey SAMs and practice in avoiding them. The GTR-18A training rockets, made of cardboard and Styrofoam, make a convincing simulation of current man-portable air defense systems. “The Smokey SAMs are giant bottle rockets, basically,” says MSGt. Rick Karlslyst, AATTC’s resident Rocket Man. “But they sure get a crew’s attention when we launch one.”
THE RANCH

The second half of the course takes place at Libby Army Airfield at Fort Huachuca, Arizona. AATTC occupies an 8,000-square-foot facility known as the Ranch, which has mission planning rooms, an operations area, and maintenance and aerial port shops.

After crews arrive in Arizona, they fly a low-level awareness training flight to familiarize themselves with the area and with mountain flying. As before every sortie, the crews receive an intelligence briefing.

AATTC also hosts the C-130 Intelligence Formal Training Unit, or IFTU. “IFTU students brief the crews on the scenario threats affecting the missions during the aircrew training course,” notes Rivera-Rivera. “They fly along with all the crews to experience the aircrew interaction and how crew members use the threat information they provide. This experience is invaluable in their ability to support air mobility operations more adequately.”

The IFTU students who brief the aircrews are recent graduates of the intelligence technical school. The technical school teaches how to support fighter operations because the fighter’s mission is the most threat-intense. “We tailor the training from the technical school to support airlift operations,” Rivera-Rivera adds. “We want the IFTU students to be credible. We don’t want them embarrassing themselves by telling a C-130 pilot to perform a six-g maneuver to escape a SAM.” AATTC has trained more than 1,400 intelligence officers and enlisted personnel since 1989.

“This was the first time I flew in such demanding flight conditions and had to learn to survive enemy threats at the same time,” said SMSgt. Roberto Escambi, the flight engineer for the 198th AS crew. “At 300-foot altitudes or in crossing ridgelines, we have little or no margin for error. Looking at the instruments while the world spins around is not easy.”

“We have an instructor debrief at the end of every day to make sure...
crews are progressing as they should," notes Sloan. The daily debrief is a very detailed, critical evaluation of the crews—what they did right and what they did wrong. The instructor discusses the weaknesses that the instructor who will fly with a crew the next day needs to create a situation for. "For the next sortie, we may adjust things to work on skills—we may simulate killing off the navigator, for instance, to see how the pilot and copilot react."

The center's permanent staff of thirty-five includes seven Guard and four AFRC pilots and six Guard and three Reserve navigators along with one Reserve loadmaster. "I'm a bit of an anomaly in that I have spent twenty years in the Air Guard flying C-130s," says Pankau. "In addition to experience in the C-130, the rest of the instructors also have special operations experience or even fighter backgrounds. One of my senior officers was an enlisted crew member on WC-130s chasing hurricanes." About one-third of the staff travels to Arizona for each course.

The center staff also includes instructors for the other training courses (see sidebar), as well as staff for mission areas such as intelligence, aerial port, audiovisual, and maintenance. The five staff maintainers include one powerplant technician and four crew chiefs to help the unit maintainers. Before each session, the participating units are asked to bring technicians for systems such as hydraulics and avionics so that each maintenance specialty for the entire class can be covered.

**GRADUATION EXERCISE**

"The crews apply the academics they learned on Saturday in the early sorties," notes DePastino. "For the last scenario, everything learned during the course is applied."

The capstone mission is a dissimilar defensive maneuvering sortie in which crews have to avoid AAA and SAMs and face a fighter, all the while communicating with an airborne warning and control aircraft. Of course, the instructors change the scenario while airborne to create even more challenges. In addition, the crews have to hit the drop zone on time, make an assault landing on a dirt strip, and then meet a hard time on target back at the Ranch. After the crews land, a mass debrief is held.

A C-130 crew from the 189th AS at Little Rock AFB, Arkansas, acted as the airborne warning and control aircraft. "We had a ton of communications today—pages and pages of message traffic," DePastino adds. "The crews have to figure out what information they actually need. They may not need some of the information immediately, but they will need it five minutes later."

Normally, an Air National Guard F-16 unit provides the adversary. Scheduling issues resulted in a contract bandit for Class 05-009. The bandit, C. B. Sinclair, an experienced fighter pilot who flies for a company called Advanced Training Systems Integration, flew an ex-Israeli Air Force A-4N against the C-130s in mock battle.

"I was unable to get off any heater shots [heat-seeking missiles], and I was jammed up by all three aircraft," Sinclair comments. "I did get off some glancing gun shots, but no missiles. Fighters don't want to slow down to airlifter airspeeds. It's tough picking up a C-130 flying at 300 feet, particularly if it is camouflaged properly against the terrain."

After the mass debrief, the 198th AS crew summed up the extended week. "We have access to a lot of book information on tactics, but it is hard to get hands-on experience," says Maj. Antonio Figuroa, the aircraft commander. "This course combines both book learning and practice. We get to learn from our mistakes. When we see a situation again in combat, it isn't the first time we've encountered it."

"We see the entire crew utilized," navigator Maj. Amin Said notes.
“We learn the mindset: What do we want to do next? What is the pilot doing? We make threat calls and immediately react. We learn to appreciate everybody else’s duties. We also find out exactly how much we depend on each other.”

Copilot Lt. Kevin Caldwell adds an essential truth: “The more times we see a Smokey SAM, the better, quicker, and calmer we react to it. We shaved four or five seconds off our reaction time by the end of the week. The time we save between recognizing the threat and reacting to it is literally the difference between life and death.”

After the mass debrief, each aircrew and IFTU class completes one final task before going home. They are given ceiling panels from the Ranch to decorate. Most graduating crews just draw their squadron patch and sign their names. Some panels commemorate an unusual event or poke fun at the training, such as the IFTU class with a student who could not handle low-level maneuvering. That class is represented by a toy crew figure in a flight suit on a stretcher holding an airsickness bag. Taken together, the panels make an interesting art gallery. The sheer number of the panels shows how successful AATTC has become. As Said says, “You have to wonder why this course isn’t standard training for everybody.”

Jeff Rhodes is the associate editor of Code One.

Maj. Paul Pfankuch, one of the VTRAT instructors. “Antiaircraft tracer rounds range in size from ping-pong balls to footballs. Observers in a transport need to recognize instantly the difference in the signature of a rocket-propelled grenade and AAA, as they have different methods of reacting to them.”

Much of what happens in tactical air mobility today happens at night—an airlifter can make a big target during daylight hours. Because missions take place at night, support activities now also take place in the dark. In 2004, AATTC started a Night Vision Ground Personnel Course which gives students academic training on night vision goggles, as well as provides hands-on training on driving vehicles and marshalling, loading, maintaining, and fueling aircraft while wearing NVGs.

In addition to its teaching tasks, AATTC also serves as a tactical airlift laboratory. “We are looking at new C-130 flare testing,” says Capt. Tom Kroh, an AATTC weapons officer. “The current C-130 flare program was developed by two of our instructors along with the Georgia Tech Research Institute in Atlanta, Air Mobility Command, and a consulting firm. We develop new tactics, test them, and then evaluate what worked and what didn’t.”

The center’s staff is currently involved in testing the new Virtual Electronic Combat Training System, or VECTS, a laptop computer that will be carried aboard an airlifter to stimulate an aircraft’s electronic warfare system. VECTS, which is tied to the satellite-based global positioning system, will give crews the ability to practice avoiding simulated threats on any training flight anywhere without the need for special training ranges.
“IT’S GOING TO BE A WILD RIDE AROUND HERE THE NEXT YEAR AS WE CONVERT TO THE C-5 GALAXY,” SAYS BRIG. GEN. BRUCE DAVIS, COMMANDER OF THE 445TH AIRLIFT WING AT WRIGHT-PATTERSON AFB NEAR DAYTON, OHIO. “WE HAVE TO GET AIRCREWS TRAINED, MAINTENANCE TRAINED, BUILDINGS BUILT, AND RAMPS ENLARGED. ALL THAT, AND, OH, BY THE WAY, WE STILL HAVE A MISSION TO DO WITH OUR CURRENT AIRCRAFT.”
The 445th AW operates the very last C-141 StarLifter transports still in service. For the last two years, the wing’s C-141s have served as the primary aeromedical evacuation, or AE, platform for casualties coming out of Iraq. An Air Force Reserve Command unit, the 445th AW was activated in March 2003 at the start of Operation Iraqi Freedom, and approximately 620 of the wing’s Reservists were called to active duty. The mandatory two-year activation limit was reached earlier this year, but the AE mission requirements remain.

Now the StarLifter crews volunteer to fly the four-a-week missions from Wright-Patterson to Ramstein AB, Germany, staging point for the AE flights. They make one flight into Balad, Iraq, and then return to the United States with servicemembers who were injured just a few days before. This schedule is expected to continue until at least the early fall.

The wing’s first C-5A arrives in October.

Big Conversion, Converting Big

“We will have enough people trained to start using the C-5 as soon as it gets here,” notes Davis, who worked though the C-5 wing conversion at Kelly AFB (now Kelly Annex), in San Antonio, Texas, earlier in his career. “People started moving into training early on. We have a good plan.”

Implementing that plan is the task of Lt. Col. Anne Gunter. “This job can’t be done by one person,” she notes. “We have an outstanding team. There is a great working relationship between the base, AFRC, and the Army Corps of Engineers to get all the actions planned and going. Wing maintenance and ops have been very cooperative as well.”

Converting to a new aircraft is always a huge task, but converting to a C-5 brings a unique set of issues. The hangars built to house the B-52 bombers that once were parked on the wing’s West Ramp accommodate the C-141s, but not the giant C-5s. In addition to occupying hangar space, Galaxys also take up considerable ramp space, and the 445th AW will eventually be assigned eleven C-5s.

Eleven major military construction projects, valued at $62.8 million, are under way or are planned through FY07. These projects include renovating existing facilities and buildings, installing a C-5 simulator, and expanding the ramp and aprons. The big projects, in terms of both dollars and square footage, are two new hangars and a fueling cell.

“We’re going to have one multipurpose hangar,” says Gunter. “It will be the aircraft wash rack and will also be used for maintenance. The weather here is a critical item, so the aircraft’s tail will be completely enclosed. When we started, we got maintenance to list their requirements— electrical connections, storage, lighting, etc., and we made sure those requirements were included in the design.”

The Wright-Patterson team also visited other C-5 bases to pick their collective brains for what was needed in Ohio. The wing conversion involves so many activities, such as relocating maintenance shops and telephone lines while the hangars are being built, that an intranet database was designed so all concerned parties could keep tabs on the schedule of what was happening when.

Filling The Ramp

Operations and maintenance are charging forward as well. “More and more maintenance troops are cross training into the C-5,” notes Davis. “We started training the aircrews in the spring. The first year, we want to have three trained crew members per position. One of those crew members will be an instructor. We are also setting up a C-5 standardization and evaluation section.”

Once pilots or copilots retrain into the C-5, they are sent to Dover AFB,
in June 2006. The very last C-141 is also scheduled to retire shortly after that—forty-two years and six months after the first aircraft was flown.

“This conversion is unusual in that the C-141s are still so heavily tasked even while they are being retired,” observes Gunter. “When we get down to eight aircraft, which will likely be this September, our mission in the area of responsibility, or AOR, is supposed to stop,” adds Davis. “It may go on a little longer than that.”

Four Flights A Week
In FY04, the 445th AW hauled 18.5 million pounds of cargo and moved nearly 31,000 passengers and 9,050 patients out of the AOR on a four-flights-a-week schedule. In the first quarter of this fiscal year alone, the C-141 crews moved 3.7 million pounds, 5,600 passengers, and 2,400 patients. “The C-141 can still move more litters than any other jet in the Air Force,” says MSgt. Gregory King, a wing maintainer regularly deployed to Ramstein AB, Germany. “It is still doing what it is supposed to do.”

“Our mission capable rate is way up—nearly seventy-seven percent,” notes Davis. “The C-141 is still a good airplane. Our C-141s are forty years old, most with more than 30,000 hours on them, and they just keep working. Our maintenance troops deserve a lot of credit.”

The 445th Aircraft Maintenance Squadron has sixteen mechanics, mostly Air Reserve Technicians—that is, full-time personnel—along with some traditional Reservists deployed for thirty days at a time to care for the aircraft while the C-141s are in Germany. "We have a supply of parts at Ramstein. If we need a specialty part, such as a mission computer, we just call back to Wright-Patterson,” says King. “Another flight is always on the way here, so it can bring the part.”

“During the war, we had six or seven aircraft here, plus an alert aircraft. We were running two missions a day,” recalls TSgt. Bill Selman, another maintenance technician. “The amount of maintenance we had to do on the aircraft then actually went down.”

“These aircraft need a little TLC, but we work around the clock to keep them flying,” adds King. “ Bringing the injured out of the desert is an important mission.”

Heading Down Range
After arriving at Ramstein mid morning, the C-141 aircrews go into crew rest. The next afternoon, they take off for Balad and return to Ramstein the following morning. They fly back to the US the day after that.

Dramatic improvements in combat medicine and the aeromedical evacuation system have greatly reduced the
time it takes to get the injured from the theater to higher level medical care. Patients move so fast, in fact, that when a C-141 crew is flying to Germany midweek, many patients whom that evac crew will transport to Andrews AFB, Maryland, three days later on their return flight haven’t even been injured yet.

“We show up at the air terminal operations center and get briefed on the cargo we will be taking down,” says Capt. Bryan Bergen, a C-141 aircraft commander. “Then we get an intel brief on the airfield—what has happened in the last twelve hours. We review the airfield approach data and the tactical data, such as radio frequencies. Then we begin flight planning. From that point, it is a normal airlift mission. That is, until we get in the area.”

Meanwhile, the C-141 is loaded for Balad. It can carry eight pallets and 33,600 pounds of cargo. The heavier pallets are loaded in the middle of the aircraft, often carrying delivery addresses like “Snake Street, Balad AB, Iraq.” There’s really no need to put street numbers—everybody there pretty much knows where everything is located. The medical crew and their equipment are loaded last.

The augmented aircrew for the Balad missions consists of the aircraft commander, one copilot, one pilot sitting in the jump seat, two flight engineers, and two loadmasters. The aircraft also carries a flight mechanic, as Balad is not a place where crews want to get stranded. Bulletproof Kevlar plates cover the flight deck floor and run up the sides of the center instrument console. Even the base of the pilot’s control yoke is protected.

Takeoff at Ramstein is usually planned to allow for maximum night operations. Balad is one of the most attacked bases in Iraq, but it is still safer than flying into Baghdad. The desert terrain makes it slightly safer to fly into, as aircrews and defenders on the ground can see the bad guys coming. If there is a muzzle flash from an insurgent around Balad, US forces there will immediately shoot or bomb them.

During the five-hour flight, the flight engineer configures the aircraft to minimize potential damage from a ground attack, such as shifting fuel in the tanks. He also turns off the external lights. “We put observers in the windows to look for hostile fire,” says Bergen. “The observers wear helmets and flak jackets. We usually just put on the flak jackets. We choose a random route in case the bad guys are watching the airfield and are armed. We have defensive systems, but we try to minimize exposure to any threats, such as small arms and shoulder-fired SAMs. We land, unload, and then the loadmaster and medical crew start reconfiguring for the AE part of the mission.”

Immediate Care
The C-141 is regarded as a nearly ideal AE platform. “The C-17 can only carry nine litter patients with the equipment stored on board. We have to bring extra gear and special stanchions to carry additional litter patients,” says Maj. Darin Gunnink, a medical crew director, or MCD, with the 791st Expeditionary Aeromedical Evacuation Squadron. “If a C-17 is identified in the system, some patients may have to be floor loaded—their litters tied down on the floor. It does have better lights and better temperature control than the C-141. But any C-141 can be converted to an AE platform after carrying cargo. With the comfort pallet—the extra lavatories and kitchen carried on board—we can carry seventy-six total ambulatory and litter patients on the C-141.”
The aeromedical technicians, called aeromeds or med techs, set up the litter stanchions in the aircraft while the loadmasters get the aircraft ready. Personnel at the combat aeromedical staging facility in Balad determine the order in which the patients are loaded onto the aircraft. The ambulatory and less critical patients are loaded first.

The critical care air transport team, or CCATT, patients are loaded last onto the aircraft so that they can be unloaded first upon arrival at Ramstein. This loading procedure allows CCATT patients to spend less time on the aircraft. They are always placed on the right side of the aircraft where the oxygen connections are located. Each CCATT (pronounced see-cat) patient is assigned one specific doctor, nurse, and medical technician. More than sixty pounds of specialized medical equipment is attached to the litter and mounted over the patient. Each CCATT team can handle three critically injured patients.

The medical crew, which normally consists of an MCD, three nurses, and four medical technicians, takes care of all of the other patients on board. The 791st EAES is composed of active duty, Guard, and Reserve medical team members who are combined into one squadron. Many EAES members now have more than 100 missions down range—the universal term for going in theater. “It makes you feel really good when you can take care of heroes,” says Gunnink.

Prior to departure, the MCD and the aircraft commander confer. “Cabin altitude restrictions are necessary for patients with head wounds, detached retinas, and ear problems,” said Gunnink. “If those injuries are on board, the aircraft will then need more fuel for flying at lower altitudes. If the flight is planned right, we won’t have to stop en route unless there is a dire emergency.”

“Once the aircraft is reconfigured, we make a tactical departure. After that, the flight pretty much becomes a regular run,” says Lt. Col. Clay Pittman, an aircraft commander. “We will try to find smooth air in flight and try not to jostle the patients around too much.”

**Heading West**

During the Vietnam conflict, getting a wounded troop back to the United States often took thirty days. In Iraq, the time from injury to the US averages about four days. After just a few days at Landstuhl Regional Medical Hospital in Germany, stable ambulatory, litter, and CCATT patients are loaded onto another C-141 for the flight home.

“The Andrews missions are just about the longest flights we make,” says Gunnink. “We always fly with an extra nurse and med tech. The extra personnel gives us the ability to fly for up to twenty-four hours. We affectionately call the C-141 ‘the tube of pain.’ It gets us there, but it takes time.”

On flights where MSgt. Rick Smith is one of the loadmasters, patients get an extra treat. Shortly after takeoff, the aroma of chicken wings, shrimp scampi, and pork roast, or some other entrée de jour, fill the cabin of the StarLifter. “I really enjoy feeding people on the return trip,” says Smith. “The flight is very long and the hot meals give the patients something pleasant to remember it by. It’s also a nice way to support the medical crew. They work really hard.”

The two conventional ovens and two refrigerators on the C-141’s comfort pallet serve as Smith’s kitchen. He spends about $90 per flight of his own money for the groceries and refuses to take any money in return. “It’s just something I like to do,” he says.
Since the C-141’s operational debut on 23 April 1965, active duty, Guard, and Reserve crews have played a critical role in every conflict, natural disaster, and operation Military Airlift Command or Air Mobility Command has been involved in, delivering people, equipment, and relief supplies to just about every point on the map. However, one mission still stands above the rest.

With the signing of the Paris Peace Accords on 17 January 1973, the US involvement in Vietnam ended. On 12 February, crews flying three C-141As landed at Gia Lam Airport in Hanoi, North Vietnam. Their mission: repatriate the first US servicemen held as prisoners of war, some for close to seven years. The first aircraft to land that day, serial number 66-0177, is still in service. Today, it has been repainted in the same paint scheme it wore thirty-two years ago. Nicknamed Hanoi Taxi, it is the 445th Airlift Wing’s flagship.

After undergoing two major modification programs during its career, 66-0177, now a C-141C, has become a flying museum. The forty POWs on that first flight signed the aircraft under the wing box, and those signatures are preserved under Plexiglas. Framed photos mounted on the inside of the cargo compartment show POWs in Hanoi and aboard the aircraft. Aircrew headrest covers on the flight deck are embroidered with the black and white POW/MIA logo, and each of the crew positions has engraved plaques with the name of the crew member on that first Freedom Flight.

“We try to take a little extra care of this one,” says MSgt. Jeff Whittman, crew chief for Hanoi Taxi. “Although we take it to a lot of airshows, it was used for aeromedical evacuation missions in Iraq for three months. But its high-visibility gray and white paint limits how it can be used. It did go into Haiti last year to deliver UN troops, though.” The aircraft has logged more than 39,300 flight hours in its career.

In addition to being the first C-141 into Hanoi, 66-0177 was also the last. In May 2004, Maj. Gen. Ed Mechenbier, one of the newly freed POWs in 1973, flew the aircraft to Hanoi to repatriate the recently recovered remains of two American servicemembers killed in action. It was Mechenbier’s last flight before he retired.

“Next spring, we are going to try and gather all the former POWs we can and have a last hurrah with ’177,” says Col. Bruce Davis, the 445th wing commander. “After we convert to C-5s, we will still have three empty C-141 hangars, so we will probably keep the aircraft in one of them until the museum is ready for it.”

The National Museum of the United States Air Force is also located at Wright-Patterson AFB and plans to open a fourth major hangar gallery by 2008. Hanoi Taxi will likely share space in the new hangar with the aircraft that have served as Air Force One.

Jeff Rhodes is the associate editor of Code One.
T
he first ten Block 60 F-16s arrived in the United Arab Emirates in grand style on 3 May to a waiting crowd of government leaders, military officers, and distinguished guests. UAE Air Force pilots trained in the United States performed two passes in tight five-ship formations, landed one by one, taxied past rows of UAE flags, and parked in front of the large review stand at their new home in the UAE. As the canopies popped open, applause supplanted engine noise, and one by one, the pilots climbed down, walked to the front of their new multirole fighters, and stood at attention.

Waiting to accept the new fighters into the UAE Air Force was General Sheikh Mohammed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces. "The delivery of the first installment of F-16 Block 60 combat aircraft today is a culmination of sustained efforts by the UAE to acquire a sophisticated combat aircraft responsive to the defense needs of the twenty-first century," he said.

"The capability of our armed forces will be significantly enhanced with this aircraft," continued Sheikh Mohammed. "This landmark event is not only a result of efforts by our political leadership to modernize our armed forces, but also a result of the dedication and tireless work by our uniformed men and women to carry out this modernization."

Sheikh Mohammed then praised the abilities demonstrated by the UAE pilots. "We thank God for the safe return of these young men, who are a source of pride for all of us. We highly value their remarkable performance. I have no doubt the UAE is teeming with young men and women capable of responding to a national call to serve their country. I'm also confident they have the ability to grasp the modern technology utilized by this advanced fighter."

US Ambassador to the UAE Michele Sison noted the delivery of the Block 60 F-16s represents the high level of cooperation between the United States and the United Arab Emirates. "The F-16 Block 60 cements our military relationship," she said. "The delivery of the aircraft and the associated training represent a significant step forward for our strategic relationship. Together we have worked hard to ensure that the UAE obtains a highly advanced aircraft to meet its security needs and to enhance our interoperability."

For US Air Force Vice Chief of Staff Gen. Michael Moseley, the delivery of the Block 60 F-16s represents more than a decade of effort to obtain an advanced combat aircraft for a critical ally. "The UAE F-16 Block 60 is critical to the
development of a strong defense capability for the United Arab Emirates,” he said. “Besides serving a deterrent function, these F-16s have come to symbolize the growing strategic partnership between the United Arab Emirates and the United States. This is a great day for the United Arab Emirates, especially for the UAE Air Force.”

For Lockheed Martin Aeronautics Company, producer of the Block 60 F-16, the delivery represents the culmination of efforts of the Block 60 program team, which includes contractor, US Air Force, and UAE personnel. “We are impressed by the expertise of the UAE Air Force representatives and are proud of our joint accomplishment in fielding this outstanding new fighter,” said Ralph D. Heath, Lockheed Martin Corporation executive vice president for Aeronautics. “The beginning of operations with the Desert Falcon opens a new chapter in the F-16’s long history of successful technology evolution and innovation. This new F-16 version is unmatched in a broad range of capabilities, from its powerplant to its self-defense electronics.”

Following the arrival, Sheikh Mohammed and other officials were briefed on the capabilities of the Block 60 F-16, including its performance, armament, and operational characteristics. Sheikh Mohammed then congratulated the pilots and crew members, posing for photos with them.

The Block 60 aircraft, designated F-16E (single-seat) and F-16F (two-seat) aircraft, and nicknamed Desert Falcon, is the latest and most advanced version in the long line of F-16s to roll out the Lockheed Martin production plant in Fort Worth, Texas. The UAE has ordered eighty of these aircraft. This cell of ten aircraft is the first installment.

The F-16E/F was flown for the first time in December 2003. Flight testing began in early 2004 and continues with three F-16F models. UAE pilot training on the F-16E/F began at the 162nd Fighter Wing, the US Air National Guard unit charged with training international F-16 operators, at Tucson International Airport, Arizona, in September 2004. The first group of UAE pilots completed training in April 2005.

Eric Hehs is the editor of Code One.
The origins of the U-2 can be found at the start of the Cold War when the Soviet Union drew the Iron Curtain between it and its satellite states and the free world. After the Soviet Union blocked all foreign supplies from entering democratic West Berlin in 1948 in an attempt to place all of Berlin under Soviet control, the United States recognized the need to keep anonymous tabs on what was rapidly becoming a Soviet threat. The problem was the spy planes in the US Air Force inventory at the time were not capable of penetrating Russian airspace with impunity. The solution was to create new intelligence-gathering platforms.

Wright Air Development Center, the Air Force research center that explored flight in the 1950s and ‘60s, prepared specifications for a aerial reconnaissance plane and asked three potential design contractors to bid on the spy plane—Bell, Fairchild, and Martin. Although Lockheed was not in the initial group, the oversight did not deter Lockheed’s famed designer Clarence L. “Kelly” Johnson from submitting an unsolicited proposal. Johnson’s design consisted of a fuselage borrowed from the Lockheed XF-104 with seventy-foot wings attached to it. The Air Force rejected the Lockheed design, designated the CL-282, in favor of Martin’s design, the RB-57D, which was a highly modified B-57 Canberra medium bomber.

After the RB-57D was selected, the administration of President Dwight D. Eisenhower realized that gathering intelligence on the Soviets could be achieved effectively only by reconnaissance overflights at altitudes near 70,000 feet to avoid surface-to-air missiles. Such altitude was unachievable by the RB-57D. To resolve this deficiency, Eisenhower assembled a committee to reexamine all proposals, including the unsolicited Lockheed design. The committee selected the CL-282. It liked the CL-282’s performance characteristics and its comprehensive support package. And it particularly liked Lockheed’s promise to have four aircraft ready for deployment in only seventeen months.

The world’s most advanced surveillance platform took to the skies for the first time in August 1955 when the U-2 made its maiden flight. Fifty years later, the U-2 continues to provide unmatched capabilities as the backbone of airborne intelligence collection for the United States. BY ELLEN BENDELL
The CIA received approval from President Eisenhower in late November 1954 to proceed with the development of the U-2. Final design and construction began almost immediately at the Lockheed plant in Burbank, California. The first prototype was flown about eight months later.

After thirteen years of service—and numerous configurations—U-2 production ended in 1968. In the intervening years, the original design had evolved into the U-2R with an airframe approximately forty percent larger than the original aircraft, which by this time had picked up the nickname Dragon Lady.

The production line reopened in 1980 to accommodate an Air Force requirement for additional U-2Rs (designated TR-1s) and a NASA requirement for two ER-2s, an Earth Resources version of the aircraft. The first ER-2 was delivered to the NASA Ames Research Center near Sunnyvale, California, in June 1981. It joined two U-2s already performing NASA missions, such as water resource evaluation, land use development, disaster assessment, and stratospheric sampling.

New deliveries to the Air Force began in September 1981 and concluded in October 1989. Initially introduced as TR-1s, all of the aircraft in this production run were later officially redesignated U-2Rs.

The Air Force fleet of U-2R aircraft was retrofitted with General Electric F118-GE-101 turbofan engines in the late 1990s to increase the aircraft’s range, altitude, and payload. The new engine also alleviated rising costs associated with maintaining and operating a 1950s-era engine design. Other upgrades included an emergency start system, electrical generator systems, and digital autopilot to give the aircraft an increased service life expected to extend to the year 2020 or beyond. The upgraded aircraft was designated U-2S.

The U-2S and the ER-2 were recognized with the 1998 Collier Trophy, which is given annually to the most outstanding achievement in American aviation the previous calendar year. It is considered the most prestigious aviation award in the United States.

The U-2S and the ER-2 variant established several world records in 1998. Two records were set by pilots flying both a U-2S and an ER-2 when they each flew a payload of 3,300 pounds to an altitude of 49,000 feet. The third record was set by an ER-2 when it attained 68,700 feet to surpass its previous record of 62,500 feet. This new record broke an absolute altitude record for its weight class.

The U-2S Reconnaissance Avionics Maintainability Program, or RAMP, accounts for the latest upgrade to the U-2S fleet. The program calls for refurbishing the 1960s-vintage cockpit with new equipment to include three multifunction displays, an up-front control and display unit, and an independent secondary flight display system.

The first upgraded U-2S reconnaissance aircraft, equipped with state-of-the-art cockpit displays and controls, was delivered to the 9th Reconnaissance Wing at Beale AFB, California, in April 2002. The aircraft have since seen operational service over Afghanistan and Iraq, as well as over other locations. As a result of continuous airframe upgrades, engine improvements, and sensor modifications, the U-2S is capable of providing leading-edge intelligence collection capabilities well into the twenty-first century.

Ellen Bendell is a communications representative with Lockheed Martin Aeronautics Company in Palmdale, California.
KC-130, KC-135, and KC-10 tankers competed during the weeklong event. An additional nine countries sent observers. Overall, participation was down from previous Rodeos, though, as many Air National Guard and Air Force Reserve Command units did not field teams because of operational commitments. Nonetheless, the competition was just as spirited as in the past.

In the air, the crews combined to fly sixty-seven sorties that included precisely navigating waypoints at specified times; air refueling; and airdropping heavy equipment, container delivery system bundles, or some of the more than 2,000 Army paratroopers who participated. On the ground, security forces teams fired shotguns and pistols for accuracy; aeromedical evacuation teams made triage assessments on dummy casualties; and aerial porters quickly loaded and unloaded an aircraft while its engines were running and navigated an obstacle course in a Tunner cargo-loading vehicle.

At the end of the week, the 6th Air Mobility Wing claimed Rodeo’s top honors. The KC-135 unit from MacDill AFB, Florida, was awarded the Gen. William G. Moore, Jr., Trophy for being the wing best prepared to execute its mission. The award is based on all phases of the competition: aerial port, security forces, maintenance, and flying proficiency. The wing was also assessed in the fit-to-fight competition, which measures how well selected
members of the team meet the Air Force’s physical fitness standards. The winner of the best overall wing competition is based on what the Air Force calls a z-score. The score is derived from a mathematical formula that allows dissimilar events on dissimilar platforms to be compared on an equal footing.

A new twist at Rodeo 2005 was that all of the personnel drops and aeromedical team events took place at night, reflecting current operational practices. Likewise, airlifters big and small flown into potentially hostile areas now carry a security forces team with them, and the competition at Rodeo reflected that. During the security forces team competition, an hour-long asset protection exercise, a two-person security forces team reacted to a range of situations—from negotiating with an inattentive host nation gate guard, to belligerent protesters, to an intruder trying to place a satchel charge on the aircraft.

The C-130J participated in Rodeo for the first time this year and claimed the trophies for both Best C-130 Wing and Best Airdrop. "Over the course of the competition, we knew we were doing pretty well," said Col. Andy Hamilton, operations group commander for the 314th Airlift Wing from Little Rock AFB, Arkansas, which flew the C-130J in the competition. "We had some really high-speed people on this team; our people and equipment did well. Everybody else was gunning for the C-130Js, but no other airlifter could quite reach us." The C-130J crew put one of its container delivery system airdrop loads less than forty feet from the target, besting the drops from the other C-130, C-160, and C-17 units.

The US Marine Corps also participated in Rodeo with both an older KC-130R and a factory-fresh KC-130J. "We participated in all of the airdrop events, including heavy equipment, container delivery system, and personnel," said Maj. Jason Julian, team chief for VMGR-352, the Hercules tanker squadron at MCAS Miramar, California. "We brought our newest KC-130J, which we just got in May. We wanted to see if the tactics and procedures that the Marine Corps has developed worked with those of the Air Force, and they do. We were very competitive."

The 60th AMW at Travis AFB, California, which consists of both airlift and tanker squadrons, did well in the competition, winning awards for Best C-5 Wing and Best Airland Wing on the transport side and Best KC-10 Wing and Best Tanker Wing on the aerial refueling side. The Best International Team award went to the United Kingdom. The winning team, members of 47 Squadron based at RAF Lyneham, the Royal Air Force’s main C-130 base, competed with a Hercules C Mk. 3—also known as a C-130K.

During the awards ceremony, which was broadcast live to air mobility bases around the world via satellite and through the Internet, the C-141 StarLifter was recognized as its forty-year service career draws to a close. A historical video of the this first jet transport and its accomplishments was shown, accompanied by vocalists with the Air Force Band of the Golden West singing the Gladys Knight hit, “Neither One of Us Wants To Be the First To Say Good-Bye.” The Best C-141 Wing Trophy, which had been awarded at Rodeos for the past three decades, was officially retired and presented to Lockheed Martin. George Shultz, vice president of the C-5 Modernization program at Lockheed Martin, accepted the trophy from Gray and Gen. John Handy, commander of US Transportation Command and Air Mobility Command.

Rodeo has been held regularly since 1962; however, real-world events prevented Rodeo from being held since the last one in 2000. This competition was the fourth time McChord AFB served as host.

“Rodeo 2005 allowed us to show what we learned in Afghanistan and Iraq and in humanitarian airlifts like the tsunami relief earlier this year,” said Gray. “This competition was an awesome demonstration of air mobility in the air and on the ground.”

Jeff Rhodes is the associate editor of Code One.

Left to right: Best C-5 Team—60th Air Mobility Wing from Travis AFB, California; Best Airdrop Team—314th Airlift Wing from Little Rock AFB, Arkansas; Best International Team—47 Squadron based at RAF Lyneham, United Kingdom. Photos by Jeff Rhodes
Lockheed Martin’s Low Speed Wind Tunnel in Marietta, Georgia, recorded its 100,000th test hour in May. Since the facility opened in 1967, everything from satellite dish antennas, to scale models of aircraft or design concepts, to full-scale production and race cars have been tested in winds up to 200 mph. More than fifteen aircraft types have recorded at least 100 test hours, with the three F-35 variants, C-130, and F/A-22 topping the list. More than 57,000 hours have come from testing automobile and race car designs. The winds are produced by a 9,000-hp motor that drives a thirty-nine-foot-diameter fan.

**WC-130Js Hunting Hurricanes**

After Tropical Storm Adrian formed off El Salvador in May, the National Hurricane Center called on the Hurricane Hunters from Air Force Reserve Command to track it. The 20 May mission marked the first operational mission in which a 53rd Weather Reconnaissance Squadron crew piloted a WC-130J into an active hurricane. The 53rd WRS has been converting to the WC-130J during the past few seasons, ensuring it is a stable platform for weather reconnaissance. Previously, crews flew the WC-130J model into storms for training and evaluation but never for fulfilling a tasking from the National Hurricane Center. Winds reached 105 mph at flight level during the eleven-hour flight.

**Stranded Fishermen Found**

A P-3 Orion crew from Patrol Squadron Eight played a critical role in the 10 April rescue of the crew of the *Maria Emelyn II*. The fishing vessel had been adrift in the South China Sea since 21 March. The US Navy offered assistance after attempts by the Philippine navy and coast guard to locate the four fishermen were unsuccessful. Missions were flown from Kadena AB at Okinawa, Japan, and Subic Bay, the Philippines. VP-8 began search operations 6 April and located the vessel three days later near the Spratly Islands. VP-8, based at NAS Brunswick, Maine, is on a routine six-month deployment to the Seventh Fleet area of responsibility.
**Darfur Airlift**

US European Command began deploying airmen and equipment to Kigali, Rwanda, in July to provide logistical and airlift support of Rwandan forces as part of the African Union’s expanded mission in the Darfur region of Sudan. Three USAFE C-130 Hercules transports and approximately 150 Airmen from bases at Ramstein AB, Germany, and RAF Mildenhall, United Kingdom, along with additional strategic support from US Transportation Command, will rotate Rwandan troops from Kigali, Rwanda, to El Fashir, Sudan. The US airlift is part of the larger multinational effort to improve security and create conditions in which humanitarian assistance can be more effectively provided to the people of Darfur.

**Updated Orions Delivered**

Lockheed Martin delivered the first US Navy’s Update II.5 P-3C aircraft modified under the Anti-Surface Warfare Improvement Program, or AIP, in June. Update II.5 aircraft are older P-3C models that, in many cases, have seen less operational use than subsequent production aircraft. To date, Lockheed Martin Maritime Systems & Sensors has upgraded sixty-six P-3C aircraft with AIP upgrade kits. The US Navy plans to upgrade a total of seventy-three P-3C aircraft. The AIP update program, which first concentrated on the Update III model P-3C aircraft, is now focusing on earlier aircraft. Extending the upgrades to the Update II.5 aircraft further improves the aircraft’s surveillance role in military and humanitarian missions.

**Updated Aurora Delivered**

The first CP-140 Aurora modernized with new electro-optics and infrared sensors rejoined the Canadian Forces fleet at CFB Greenwood, Nova Scotia, in July. Lockheed Martin Canada redelivered the aircraft after completing a rigorous joint testing program with Canadian Forces. The new sensors, which are part of the Aurora Incremental Modernization Project, provide an interim solution until the sensors are fully integrated with the aircraft’s modernized mission system in 2008. The CP-140, a version of the P-3C Orion, is Canada’s primary strategic airborne land and sea surveillance aircraft. The complete Aurora modernization program will extend the aircraft’s service life until approximately 2025.

**1,000 Viking Traps**

On 2 June, the commanding officer of VS-30, Cmdr. James R. Shoaf, became the first S-3 Naval Flight Officer ever to achieve 1,000 S-3 carrier arrested landings. Shoaf reached this milestone as a contingent from the squadron, known as the Diamondcutters, prepared to fly off the USS *John F. Kennedy* (CV-67) after a public relations tour in Boston and in New York City for Fleet Week 2005. His first trap came on 29 October 1986. The first S-3 aircrew member to achieve 1,000 S-3 traps was Cmdr. James S. Wagner, who set the milestone in 2001 also onboard the *Kennedy*. Wagner was a pilot and also the commander of VS-30 at the time.
Thunderbird Milestones

Officials from the US Air Force Air Demonstration Squadron announced the new pilot roster for the 2006 demonstration season in June, adding the first female demonstration pilot in the fifty-two-year history of the Thunderbirds. Capt. Nicole Malachowski of the 494th Fighter Squadron at RAF Lakenheath, England, joins the team as the first female demonstration pilot on any US military high performance jet team. The Thunderbirds celebrated 1,500 airshows in the F-16 on 7 July at the Wings Over Pittsburgh airshow at Moon Township Reserve Base in Pennsylvania. The Thunderbirds have been flying the F-16 since 1983, switching to the F-16C in 1993.

First US Air Force C-130J Combat Airdrop

The newest addition to the US Air Force cargo fleet proved another capability in June during the first-ever USAF C-130J combat airdrop. The C-130J crew dropped a total of twelve bundles of civic aid and supplies weighing 16,000 pounds during two airdrops near Kandahar, Afghanistan, in support of Operation Enduring Freedom. A Rhode Island Air National Guard crew from the 143rd Air Wing, Quonset-Holland ANG Base, deployed to the 379th Air Expeditionary Wing, flew the mission. The deployment of the C-130J into Southwest Asia is the second time the new model has served in the US Central Command theater of operations.

Egyptian Team Deactivated

The final F-16 Peace Vector II team was deactivated on 23 June with a ceremony at the Beni Suef Support Compound, Beni Suef AB, Egypt. The Peace Vector II Extended Training Service Specialist teams, collocated with and also led by the PVII commander, began in 1986. The PVII/ETSS team commander, a US Air Force officer, advised the Egyptian Air Force and also served as the functional area commander of the Beni Suef Support Compound, a sixty-nine-acre housing and support facility for American military and contractors located seventy-five miles south of Cairo. Since PVII began, the 242d Wing has flown more than 50,000 F-16 hours. Forty F-16s were delivered to Egypt Peace Vector II.

More F-16s For Greece

Greece announced in July its intent to purchase thirty additional advanced F-16 Block 52+ aircraft with an option for ten more. This buy, valued at an estimated 1.1 billion Euros (approximately US$1.3 billion) supplements the existing fleet of F-16 aircraft in the Hellenic Air Force. Greek officials noted that the Advanced F-16 Block 52+ selection will meet near-term operational requirements of the HAF and that Greece is expected to secure significant industrial offset benefits. The aircraft are expected to be delivered between 2008 and 2009. The purchase will be the fiftieth follow-on buy of the F-16 by twenty-four customer countries.
**Flying Tigers, Musicians, NASCAR Drivers**

Clemson University head football coach Tommy Bowden got a unique view of the stadium of archrival University of South Carolina during his May orientation flight in the backseat of a 169th Fighter Wing F-16D. His South Carolina Air National Guard pilot on the orientation flight was Capt. Rick Noble, a Clemson graduate. Country musician Clint Black received an F-16 orientation flight in April with the 149th FW, a Texas Air Guard F-16 unit at Kelly Field Annex in San Antonio. NASCAR driver Greg Biffle received a flight in April with the 187th FW, an Alabama Air Guard unit at Dannelly Field in Montgomery. The Air Force and Air National Guard offer a ride-along program for politicians, civic leaders, and celebrities.

**1,000th T-50 Flight**

The T-50 Full Scale Development team celebrated completion of the 1,000th flight of the new advanced jet trainer in May at Korea Aerospace Industries facilities at Sacheon, South Korea. The event was attended by representatives of the Republic of Korea Air Force, other Korean government agencies, and the international industry team building the T-50. The T-50 is being developed by Korea Aerospace Industries with assistance from Lockheed Martin. The flight test program, now nearly ninety percent complete, is expected to be finished on schedule this fall. T-50 flight testing began on 20 August 2002. The fourth and last test aircraft began flying on 4 September 2003.

**Iraqi Hercules**

US pilots and maintenance personnel are now training their Iraqi counterparts at Ali Base near Tall, Iraq, to fly the three C-130E Hercules the Iraqi Air Force received from the United States. Airmen from the 777th Expeditionary Airlift Squadron at Little Rock AFB, Arkansas, are working with personnel in the 23rd Transportation Squadron, which is expected to be fully operational by May 2006. In less than six months since the squadron was activated, the first Iraqi air force pilot and copilot recently flew without a US pilot in a flight seat position. The Iraqi navigator on the flight was also fully qualified. More than sixty-five Iraqi Air Force mechanics have now been trained.

**F-35 Final Assembly Under Way**

Workers at Lockheed Martin in Fort Worth, Texas, joined the first F-35’s thirty-five-foot-wide carbon-fiber composite skinned and metal structure wing to the aircraft's fuselage on 16 May, uniting three of the F-35’s four major sections—the forward fuselage, the center fuselage, and the wing, and marking the start of F-35 final assembly activities. The F-35’s aft fuselage, built by BAE Systems in Samlesbury, England, was delivered a short time later. The horizontal and vertical tails, also made by BAE Systems, were scheduled to be delivered later in the summer. The center fuselage, produced by Northrop Grumman in Palmdale, California, arrived in Fort Worth on 3 May.

**New C-5 Schoolhouse**

Ground was broken on 27 June for new facilities that will allow the C-5 formal training unit to move from Altus AFB, Oklahoma, to the 433rd Airlift Wing at Lackland AFB, San Antonio, Texas. The new Air Force Reserve Command facility will be used to train pilots, flight engineers, and loadmasters in C-5 Galaxy operations. Students will begin attending ground and flying training in October 2006. The transition of students from Altus to Lackland will be gradual, culminating in July 2007. At that time, the 433rd AW will assume total training responsibility for about 650 students per year, with about 150 on campus in various stages of training on any given training day.
Last C-141 Crew Chiefs

The last three C-141 StarLifter crew chiefs completed training at Sheppard AFB, Texas, on 25 July. SSgt. Lauro Valles Jr., SrA Michael Engle, and A1C Adam Winebrenner will return to Air Force Reserve Command’s 445th Airlift Wing at Wright-Patterson AFB, Ohio, to work on the last C-141s. The StarLifter was the world’s first military jet transport when it was first flown on 17 December 1963, the sixtieth anniversary of the Wright Brothers’ first flight. Training at Sheppard started about the same time the aircraft started Air Force operations in 1965 and has continued ever since. The StarLifter will be retired in 2006.

Supersonic JDAM Drop

F/A-22 pilot Maj. John Teichert of the 411th Flight Test Squadron at Edwards AFB, California, completed the first drop of a 1,000-pound GBU-32 Joint Direct Attack Munition while traveling at supersonic speeds on 14 July. The drop also marked the first time a JDAM was released supersonically from an internal weapons bay. The GBU-32 Separation Test Vehicle used in the test is the same size, shape, and weight as an actual bomb but did not include the guidance kit. The speeds at which the F/A-22 will eventually release the JDAM will far exceed any current aircraft’s JDAM envelope. Subsonic testing from the F/A-22 came last year.

Marine Corps Desert Successes

Marines of Marine Aerial Transport Refueler Squadron 252 have been hard at work supporting Operation Iraqi Freedom by providing aerial refueling, troop and cargo transport, and radio relay capabilities since arriving in theater in February. In July, VMGR-252 crews reached a milestone of ten million pounds of fuel (about 1.6 million gallons). In the early morning hours of 16 April, a single KC-130J crew airdropped needed supplies to Forward Operating Base Korean Village, a remote outpost in the Iraqi desert. This drop is the first Marine combat aerial delivery for the KC-130J. VMGR-252 is based at MCAS Cherry Point, North Carolina.

Sentry White Falcon, Part II

F-16 pilots from the 170th FS of the 183rd Fighter Wing at Capital Airport, Springfield, Illinois, flew in formation with MiG-29 Fulcrams over Krzesiny AB, Poland, during exercise Sentry White Falcon 2005 in June. The 183rd, an Illinois Air National Guard unit, sent six F-16s to Poland. The US pilots met with their Polish counterparts and flew escort, intercept, and some air-to-ground missions with them. Ground crews from the 183rd also worked with their Polish equivalents. The Polish air force will start receiving its own F-16s in 2006. The aircraft will replace some of their Soviet-made fighters as the country modernizes its military to NATO standards.

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Special Delivery

SSgt. John Barr greets Lt. Col. James Heck after delivering the first operational F/A-22 Raptor to its permanent home at Langley AFB, Virginia, on 12 May. This Raptor is the first of twenty-six to be delivered to the 27th Fighter Squadron. Heck is the squadron’s commander, and Barr is an F/A-22 crew chief.

Unit Patches Needed

Code One is collecting unit patches from C-130 and F-16 units worldwide. The F-16 patches will be used to update a patch poster that appeared in the April 2000 issue of Code One. The C-130 patches will be used to create a similar poster for the Hercules. Send original wing, squadron, and special patches to: Code One Magazine, Lockheed Martin Aeronautics Company, PO Box 748, Mail Zone 1503, Fort Worth, TX 76101. Submissions cannot be returned.

F-2 Component Work Continues

Lockheed Martin received another contract from Mitsubishi Heavy Industries on 31 March to manufacture components for five additional F-2 production aircraft. This new contract, valued at more than $125 million, brings the total aircraft under contract to seventy-six.

Cold War Reconnaissance Exhibit

An exhibit highlighting the Air Force’s early Cold War reconnaissance opened to the public at the National Museum of the United States Air Force at Wright-Patterson AFB, Ohio, on 15 June. The exhibit, entitled “Dragon Lady: The U-2 and Early Cold War Reconnaissance,” joins the museum’s permanent displays in the Cold War Gallery.

Chile F-16 Flown

The first F-16 fighter produced for the Chilean Air Force was flown for the first time 23 June at the Lockheed Martin facility in Fort Worth, Texas. The Chilean F-16 Peace Puma program calls for ten Advanced Block 50 F-16s: six single-seat F-16Cs and four two-seat F-16Ds.

Birthday Flypast

A Royal Air Force TriStar KC. Mk. 1 tanker was flown in the Queen’s Birthday Flypast over London on 11 June, escorting a pair of RAF Typhoon fighters. The annual flyby marks the official birthday of Queen Elizabeth. The RAF TriStars are based at RAF Brize Norton near Oxford. In other news, six crews from the RAF’s ageing VC10 tanker fleet, also based at Brize Norton, have been transferred to the more efficient TriStar.

High-Time Hercules

While participating in Maple Flag XXXVIII in early June, CC-130 Hercules aircraft number 315 passed 45,000 hours of flight time to continue its legacy as the high-time Hercules. The aircraft, based at CFB Trenton, Ontario, is flown by 426 Transport Training Squadron and cared for by 8 Air Maintenance Squadron. Maple Flag is an international air combat exercise held annually at CFB Cold Lake, Alberta.

U-2 Honored

The U-2 Dragon Lady was chosen to adorn the logo for the ninth annual Air Force Marathon scheduled for 17 September at Wright-Patterson AFB, Ohio. The design, which honors the 50th anniversary of the first flight of the U-2, appears on the medals given to all the runners. The 88th Services Division at Wright-Patterson coordinates the annual marathon, which draws more than 5,000 runners from all over the world.

Subscription Incentive

The first twenty online subscribers or renewing subscribers on or after 15 October receive a Price Randel F/A-22 poster. To subscribe, visit www.codeonemagazine.com.