F-35 Flight Testing
A-10 Upgrades
Raptors Deploy
Hercules Christmas
It was a busy afternoon of test flights recently at the Lockheed Martin facility in Marietta, Georgia. Preparing to turn onto the active runway is the first C-130J to be delivered to the active duty US Air Force at Little Rock AFB, Arkansas, while an F-22 scheduled for delivery to Elmendorf AFB, Alaska, and a safety chase F-16 from Cannon AFB, New Mexico, wait on the taxiway.
F-35 LIGHTNING II FLIGHT TESTS
Chief Test Pilot Recounts Early Flights

THE HOGS OF WAR
A-10 Warthog Upgrades

LIGHTNING STRIKE 2020
F-35 For Close Air Support

RAPTORS DEPLOY
F-22 Heads To Kadena And Red Flag

HERCULES CHRISTMAS
A Special C-130H Operation In Alaska

BELGIUM DEPLOYS TO RED FLAG
MLU F-16s Take Part In Exercises At Nellis

EVENTS

ABOUT THE COVER
Front: The first F-35 Lightning II banks and goes into afterburner during its sixth flight. The first F-35 is going through an extensive flight test program after its inaugural flight on 15 December from NAS Fort Worth JRB in Texas. Photo by David Drais

Back: Two F-22 Raptors from Langley AFB, Virginia, fly over the coastline of Okinawa, Japan, where the 1st Fighter Wing deployed twelve Raptors to Kadena Air Base in February. The 7,700-mile deployment was the longest for the Raptor to date. Photo by Katsuhiko Tokunaga
The F-35 Lightning II took to the air for the first time on 15 December 2006 with chief test pilot Jon Beesley at the controls. During this maiden flight, Beesley performed a military power takeoff and executed a series of maneuvers to evaluate the handling qualities of the aircraft. The airplane flew to 15,000 feet and a maximum speed of 225 knots. The F-35 test program has since expanded the flight envelope of this first Lightning II and will continue to expand the envelope in the coming months. More importantly, this first aircraft is being used to evaluate the performance of highly sophisticated subsystems that form a baseline for subsequent F-35s.

Beesley has an extensive flight test résumé that begins with graduation from the US Air Force Test Pilot School in 1979. After working on several classified programs, he became one of the first USAF pilots to fly the F-117. When he left the Air Force in 1986 to join General Dynamics in Fort Worth, Texas, he initially flew developmental flight tests for an innovative night attack system for the F-16 called Falcon Eye. This program was one of the first to use helmet-mounted displays, or HMDs, and head-steered infrared devices on a tactical aircraft.

In 1990, Beesley became a project test pilot on the YF-22 during the Advanced Tactical Fighter competition. He was principally involved with evaluating and demonstrating the flying qualities of the YF-22. Many of these flights demonstrated the tremendous high angle of attack capabilities of the aircraft. Longtime Code One readers may recall his article on flight testing the YF-22, “Report From the Future,” in 1991.

After the US Air Force selected the F-22 as the winner of the Advanced Tactical Fighter competition, Beesley became the Fort Worth project pilot for the F-22 program. He was the second pilot to fly the Raptor and one of the lead pilots in envelope expansion flights. Over his career, he has accumulated more than 5,000 hours of flight time in more than forty-five different types of aircraft.

Beesley became chief test pilot for the F-35 program in 2002. He will be in charge of flight testing all three variants to be produced: the F-35A conventional takeoff and landing, or CTOL, variant; the F-35B short takeoff/vertical landing, or STOVL, variant; and the F-35C carrier variant, or CV. Code One editor Eric Hehs interviewed him for his impressions of flying the first F-35 and for his perspective on flight testing this and subsequent Lightning II fighters.
**What is your strongest memory from the first flight of the F-35?**

The thrust impressed me most. The first flight profile called for the F-35 to immediately go to 15,000 feet. I had to keep the speed at 225 knots during the climb since I had to keep the gear down, which limited the maximum speed.

I used nose attitude instead of modulating engine thrust to control airspeed during the climb to 15,000 feet. In other words, I had to raise the nose to slow down the airplane. I took off and started pulling back on the stick. I had to keep pulling back to stop from accelerating over the 225-knot limit. So I reached a rather steep angle, about twenty-five degrees of pitch. The steep angle, witnessed by the crowds on the ground, highlighted the raw power I was experiencing in the cockpit. The thrust surprised me. Not in the sense of “Gee, how am I going to handle all of this power?” But more like, “Wow, this is more than I expected.”

**What was your overall impression of the airplane after that flight?**

Overall, I was impressed by how well the entire first flight came together. I started the airplane, ran through all of our ground checks, taxied out to the end of the runway, and took off. The test team told me I taxied out to the end of the runway much faster than I did for any of the taxi tests. But I was ready to go and so was the airplane.

I was also pleased with how smoothly the airplane went through all the ground checks and how smoothly the airplane flew. As an example, the flap schedules on the original F-22 shook the Raptor at speeds above 200 knots. This objectionable buffet was addressed right away through a software change. Paul Metz [first pilot to fly the F-22] and I are the only two pilots who ever experienced that buffeting. I thought that I might experience some sort of buffeting with the first F-35, but I didn’t.

We learned a lot from the F-22. Our engineers deserve a lot of credit. In fact, many of those who completed the checkout and testing of similar systems on the F-22 Raptor are performing the same work on the F-35. To name a few prominent examples: Kevin McTeague works on electrical systems; John Magbuhat works on flight controls; Paul Thoennes works on hydraulics; and Roy Schoberle from Pratt & Whitney works on the F135 engine. Many others with similar experience did the design integration work over the last several years. We also have some seasoned veterans involved in flight testing the new airplanes, which includes Mary Beth O’Loughlin as the test conductor for the first flight. We have a great team.

**How has your impression of the F-35 changed in subsequent flights?**

I continue to be impressed with the performance of the aircraft. The F-16s flying chase don’t have near the fuel capacity or payload capability as the F-35. The Lightning II does very well in comparison. For example, the F-35 often forces the chase aircraft into afterburner when it is in military power.
The airplane’s handling qualities continue to be very good throughout the flight envelope. When I raise the landing gear, the airplane flies very smoothly. The landing gear is sequenced, which is unique for a fighter. The nose gear comes up first, then the main gear follows. The gears drop down in reverse order. Another strong impression is that the airplane wants to fly a lot faster than we are allowed to fly at this point in the flight test program. Most of the time we fly at about thirty to forty percent of available thrust. This airplane can go out to high subsonic speeds very easily without using afterburner.

Describe the basic progression of the first flight tests.

On the first flight takeoff, we received an air data degrade caution message. It indicated a mismatch in the lower-level comparison in the air data system, specifically with angle of attack. However, we had no loss of capability. Simply put, readings from the right and left air data probes need to agree within a certain tolerance, and they didn’t on the first flight. Because the air data system is redundant, we were able to fly on the left probe after the right one was turned off. The caution message cut the flight short, but we still managed to perform some of the planned maneuver blocks, which included throttle transients and one-half stick and pedal inputs. The handling qualities in these maneuvers were excellent with a notably smoother response and a better roll rate than I expected.

The greatest accomplishment of the first flight was the performance of the subsystems. The integrated power package, electrical, electro-hydrostatic actuators, flight control computers, and other subsystems worked without a problem for the entire flight. The performance of these systems is a great testimony to the team that brought the F-35 to first flight. After the faulty probe was replaced, we performed an additional 110-knot taxi test on 4 January to calibrate the new probe. We gathered additional air data on subsequent flights during January to further calibrate the air data system.

On Flight 2, we cycled the landing gear and then flew formation for the first time with the gear up. On Flight 3, we performed the first military power takeoff. On Flight 4, we performed the first low-altitude maneuvering. On Flight 5, we performed the first afterburner engine transient as well as performing other engine transient testing. On Flight 6, we conducted a fuel dump test. This test was conducted early in the flight test program to gather real-world data to inform design decisions on the fuel dump mechanization for the carrier variant, or F-35C. We performed higher angle of attack maneuvers on Flight 6 as well.

On Flight 7, we evaluated the speed brake operation. The F-35, like the F-22, doesn’t have a dedicated speed brake like most previous fighters. Instead, it decelerates through the flight control software by deflecting control surfaces in the same manner as the Raptor. We use the leading-edge flaps as well as the trailing-edge flaps and the rudders to slow the airplane. Unlike
the F-22, the F-35A and F-35B have no ailerons. That explains why it uses a combination of leading- and trailing-edge flaps and rudders to slow down. I found that the buffet levels were very low, essentially the same as buffet levels of the F-16 with the speed brake in operation. Deceleration rates in the F-35 are similar to the F-16 as well, which is a design goal.

On Flight 8, we flew the software fix for the air data system issues we saw on the first flight. The new software allowed me to use full lateral stick rolling maneuvers. Handling qualities during these rolls were outstanding with roll rates matching predictions. We had to cut this flight short because our chase aircraft had a mechanical problem.

On Flight 9, we performed the first afterburner takeoff. Flight 9 was also our longest flight to that point, 1.5 hours. We took off with 3,500 pounds short of a full fuel load and landed with about 4,000 pounds of fuel remaining. So we shorted ourselves more fuel than the entire internal fuel capacity of an F-16 and still flew for 1.5 hours without aerial refueling. During Flight 9, we also flew close formations, power approaches, and maneuver blocks to sixteen-degrees angle of attack at 20,000 feet.

On Flight 10, we flew with the HMD for the first time. The mission included full-stick 360-degree rolls, snap engine transients in afterburner, and close formation flying. We also landed in fifteen-knot crosswinds for the first time. Flight 11 involved several lower altitude maneuver blocks as well as maneuvering with the speed brake.

Jeff Knowles, the second pilot to fly the F-35, completed his first flight on Flight 12. I took the aircraft to 30,000 feet on Flight 13, performed a touch-and-go landing, completed maneuvers to seventeen-degrees angle of attack, and cycled the aerial refueling door.

As far as envelope expansion goes, we have conducted engine transients up to maximum afterburner from takeoff to 30,000 feet. We have been to 345 knots, 3.5 g’s, and sixteen-degrees angle of attack and seventeen degrees with the landing gear down. We have three engines available for AA-1 but have flown only one. We want to fly as many hours as we can on it.

Summing up the flying characteristics: the F-35 flies a lot like the F-22 and has the size and feel of an F-16. The F-35 is a solid and very responsive airplane.

How does this test progression compare to previous fighter flight test programs you have worked?

The F-35 envelope expansion and flying qualities work is similar to previous fighter programs. That similarity may give the impression that we’re conducting the same tests in the same ways. But that impression is false. A superficial comparison between the development of this fighter and the development of legacy fighters neglects mission capability.

Our customers are getting a whole lot more in the F-35 program. They are getting a baseline configuration with capabilities that required twenty or thirty years to develop for the F-16: infrared sensors, targeting pods, night vision systems, head-mounted cueing systems, and agile beam radars to name a few. During those years of development, the Air Force and Lockheed Martin conducted separate test programs to validate those capabilities. Those capabilities are all
incorporated in this phase of the F-35 program. A truer comparison between legacy programs and the F-35 program would include the development time and cost for these additional capabilities.

**Are any of these capabilities and systems unique to the F-35?**

The F-35 has many unique capabilities. The helmet-mounted display and the integrated power package, or IPP, are two good examples. We began flying the HMD on Flight 10 and have flown with it on all succeeding flights.

The HMD is much more than a helmet-mounted sight, which is flying in operational F-16s today as the joint helmet-mounted cueing system, better known as JHMCS. Our HMD also functions as a head-up display. That is, it shows all the information normally placed on the HUD, including speed, altitude, heading, and flight path information.

The system is working very well, and pilots quickly forget that the flight symbology is being displayed on the helmet rather than on a conventional head-up display. We don’t have a HUD on the first F-35. And we have no plans to put one in any other F-35. Putting an HMD in the first airplane is a gutsy call. We are on track with its development. The initial results of incorporating an HMD in the test program have been better than we expected. The HMD is a significant jump in technology. This system has been performing very well.

The IPP, my second example, is a sophisticated turbine that acts as the auxiliary power unit on engine starts. When the engine is running, the IPP functions as an environmental control system, or ECS. When required, it also functions as an emergency power unit during emergency mode transitions. The IPP, then, performs the functions of three subsystems found on legacy fighters.

**The first F-35 represents a configuration of the aircraft before the company undertook a significant weight-reduction effort. Why is the program testing an aircraft that is not completely representative of subsequent production models?**

While the internal structure may be different, the shape of this first F-35 is almost identical to subsequent production versions. So gathering aerodynamic data on this configuration gives us an opportunity to evaluate performance characteristics on a real aircraft as opposed to making predictions using models or simulations. Additionally, testing and integrating all of the new systems in the F-35, as I described previously, gives us more than a year’s head start on problems that we may encounter in testing and integrating these same systems in subsequent aircraft. Along with the HMD and IPP, other systems and features incorporated on subsequent F-35s include the F135 engine, electrical system, fuel system, electro-hydrostatic actuators, cockpit, weapon bay doors, and bay ventilation. So this first version of the Lightning II gives us an outstanding opportunity to reduce risk as we move forward with the program.

Let’s take the cockpit as one example of the similarities between this and subsequent aircraft. With the exception of two switches, the AA-1 cockpit is the same as the next F-35, which will be a STOVL variant. And that F-35B STOVL cockpit will be the same across all three variants. On the STOVL airplane, one switch will read “conversion” instead of “hook.” All of the other switches are the same. While the engine page on the F-35B has a display that deals with STOVL, most every other display on this variant is the same as the displays on the other variants. The missions systems are the same on all three variants. This commonality reduces the total scope—and expense—of the program. We are combining into one program what would have involved three separate and independent development programs in the past.

The electro-hydrostatic actuators, or EHAs, are another excellent example of risk reduction we’re accomplishing...
on AA-1. This is the first real electric jet. The flight control actuators, while they have internal closed-loop hydraulic systems, are controlled and driven by electricity—not hydraulics. The F-35 is the only military aircraft flying with such a system. We proved that the approach works on six flights of the AFTI F-16 during the concept demonstration phase of the JSF program. We already have many more flights on EHAs on this test program. Because we are flying production versions of the EHAs on AA-1, we won’t have to prove the EHA design on subsequent F-35s.

**What are the immediate production plans for subsequent F-35s, and how will those aircraft be used in the flight test program?**

Current plans call for fifteen flight test aircraft, including AA-1. The next four aircraft produced will be F-35B short takeoff/vertical landing, or STOVL, variants. These will be followed by three conventional takeoff and landing, or CTOL, aircraft. Then the first three carrier variant, or CV, aircraft will be produced followed by another STOVL aircraft and one more CV. Two more CTOL aircraft complete the production run of test aircraft. AF-1 and AF-2, the next CTOL variants to be produced, will be used for flight sciences; that is, they will be used to test aerodynamics and flight controls and to expand the flight envelope. AF-3, 4, and 5 will be used to develop and test mission systems.

We will have three F-35B, or STOVL, variants for flight sciences and two F-35Bs for testing mission systems. The first flight sciences B-model will be dedicated to STOVL operations. The other two B-models will be used to expand the flight envelope.

We will have four F-35Cs dedicated to the flight test program. The first two carrier variants will be used for flight sciences. The third aircraft will be used for carrier suitability testing. The fourth aircraft will be used to test mission systems.

We had as many as six aircraft devoted to testing mission systems for the F-22. We have seven aircraft in this program. Fortunately, everything we do on the F-35A for mission systems applies to the F-35B and F-35C. The variants have only minor differences in terms of antenna sizes and shapes.

But the real virtue of this flight test program is that we have seven flight sciences aircraft. While the F-22 had only one true flight sciences aircraft, we need more because we have three variants as well as many external payload configurations that require testing as well. The potential external loadings on the internal weapon stations and six external hard points create a very large test matrix, which will eventually include most of the weapons carried by the F-16, F/A-18, Harrier, and A-10.

**What will be the biggest challenge for the flight test program?**

For AA-1, our biggest challenge is to be aggressive enough to find out all the things we don’t yet know about the aircraft’s performance. We have some real opportunities to learn how EHAs work at high speeds. Proving the HMD is another challenge. Testing the first aircraft gives our predictions for subsequent aircraft credibility. We want to knock off all the big risks with this first airplane and reduce all the other risks for future airplanes.

After that, a big challenge is managing fourteen flight test aircraft in three test sites. Testing short takeoffs and vertical landings is always a challenge. First, we have to make STOVL work. We have to make short takeoffs and vertical landings as straightforward and as easy as possible. Pilots should not have to spend most of their training time on the first and last five minutes of the flight. How we mechanize transitions from horizontal to vertical flight will free up time for training skills more pertinent to the mission.

Developing mission systems will be a huge challenge, and testing those systems is one of the more critical parts of the program. The CATBird, a 737 modified to carry the F-35 sensor suite and associated systems, will help us reduce risk associated with mission systems. The number of weapons and configurations to clear also represents a challenge. If pilots can’t employ weapons, the airplane is of no value. And we are testing these weapons in a large envelope. The F-35 can maneuver post-stall like an F/A-18. So we have a lot ahead of us. But we are certainly up to these challenges.

*Eric Hehs is the editor of Code One.*
That is how Lt. Col. Dan Marino, the 175th Wing’s operations group commander, describes the dual task his Maryland Air National Guard unit has faced. The 175th Wing’s 104th Fighter Squadron is currently completing a conversion to an upgraded version of the A-10 close air support aircraft and preparing for an Air Expeditionary Force deployment later this year.

The A-10, officially christened Thunderbolt II, but universally referred to as Warthog because of its ungainly appearance, is the first US Air Force aircraft specifically designed for close air support of ground forces. The A-10 entered service in 1976.

The Warthog, or more simply, Hog, is a relatively uncomplicated design. The Air Force’s requirements at the time were straightforward—the aircraft had to carry a large ordnance load, have extended loiter time over the battlefield, provide good maneuverability at low speeds and low altitudes, be easy to maintain, and be able to operate from small, forward bases. The aircraft didn’t necessarily have to be fast. In fact, combat speed of the A-10 is around 450 knots, much slower than its fighter contemporaries.
The thinking at the time was that the A-10 would have to provide close air support and be able to halt a Soviet advance coming through Germany. Consequently, the aircraft was built around the mammoth General Electric GAU-8/A Avenger 30 mm seven-barrel Gatling-type cannon, which was specifically designed to destroy tanks.

During the 1991 Gulf War, A-10s had a mission capable rate of 95.7 percent. Warthog pilots flew 8,100 sorties, launched more than ninety percent of the AGM-65 Maverick air-to-ground missiles used in the war, and destroyed 987 tanks and more than 1,800 trucks and vehicles.

“If you look at the history of the A-10, every new capability, every new system put on the jet is an add-on,” notes Maj. Doug Baker, a 2,000-hour pilot with the 104th FS. “After continually adding systems, we had an aircraft with all this extra stuff it was never originally designed to have. For instance, we had a targeting pod, but the pod was never fully integrated.

We had to tell the computer the aircraft was carrying a Maverick. We had to put target coordinates in by hand. Under the upgrade program, we are ripping out all of the old independent systems and replacing them with a comprehensive system that is expandable, and it works.”

The Precision Engagement, or PE, program significantly increases the pilots’ situational awareness and their ability to accurately detect, identify, and destroy targets in all weather from greater altitudes and distances using precision-guided weapons.

PE is a five-year program to upgrade all 356 aircraft now in the Air National Guard, Air Force Reserve Command, and active-duty Air Force A-10 fleet. During the 1970s, two modified A-10s were designated A-10B, so the modified A-10As are redesignated A-10Cs.

The Air Force awarded the PE development contract in 2001. Lockheed Martin in Owego, New York, teamed with BAE Systems, Southwest Research Institute, and Northrop Grumman to develop the upgrade kit. The first prototype A-10C was flown in 2005. The first production kits were delivered to the Ogden Air Logistics Center at Hill AFB, Utah, for installation in March 2006. The 104th FS received its first production A-10C last August.

Most of the changes are related to avionics. The A-10 is now wired to carry either the Lockheed Martin AN/AAQ-33(v) Sniper XR or the Northrop Grumman AN/AAQ-28 Litening AT advanced targeting pod. The upgrade also includes an upgraded 1760 data bus running to six of the aircraft’s eleven weapon stations, which enables the A-10 to carry the GBU-31/32/38 Joint Direct Attack Munition series and the CBU-103/104/105 Wind-Corrected Munitions Dispenser; upgraded DC power converters; and a digital stores management system.

The Situational Awareness Data Link, or SADL, is also part of the upgrade. “Being a guy who never flew with a radar, seeing the SADL picture is magic,” Baker observes. “We share data, and it is all secure. With SADL, you don’t necessarily have to input target coordinates manually. I just slave the targeting pod to what I’m looking at, and the system figures out the coordinates.

Then I can send that information to the other jets so everyone is looking at the same thing.”

In the cockpit, the A-10C pilot has two five- by five-inch color multifunction displays with a moving map as well as a new control stick and throttle. “The jet was all analog and manual before,” notes Marino. “I had to reach up to the instrument panel and throw switches and push buttons to drop a bomb. Now, I can change the switch positions and drop weapons without taking my hands off the throttle or stick.”

The last four 104th FS pilots went through conversion training in March. The unit now has fifteen A-10Cs on the ramp, with six more coming because of force realignments. But getting to this point took effort. “We volunteered for A-10C,” says Lt. Col. Kevin Campbell, a Warthog pilot who is the 175th Maintenance Squadron commander. “Funding for the program was in jeopardy, but the Guard provided an infusion of cash. That allowed us to go forward and put the Guard at the forefront of the program.”

The 104th FS and the 110th Fighter Wing at Battle Creek, Michigan, were chosen to lead the fleet. “We committed the lead aircraft to the program. That was key to keeping the line moving,” notes Campbell, who moved his family to Nevada to stand up a Guard detachment at Nellis AFB outside of Las Vegas. There, the 104th Fighter Squadron and the active duty 422nd Test and Evaluation Squadron brought the A-10C into operation.

“The Guard operation at Nellis is the big success story,” adds Campbell. “We kept sortie generation up and made sure we got the test points. We provided a lot of experience on the pilot and maintenance sides. We have been living the Total Force concept at Nellis since November 2005.”
“We had the Guard and the active duty embedded together at Nellis,” recalls CMSgt. Terry Allen, the wing’s maintenance chief. “We have people who have been working on this jet for twenty years who helped develop the training documents for the A-10C. We sent close to fifty percent of our people to train at Nellis for thirty-five days at a time.

“What we did at Nellis kept development of the C-model on track,” Allen adds. “We had, and are still having, some growing pains. The A-10C mod is a little challenging. We finish at Nellis this July. We thought we were going to be there only six months. But we overcame. We fly at Nellis; we fly in Baltimore.”

“I was a part of the initial cadre on A-10C testing,” notes Baker. “Four of us are in test. We had to get what is called a Testing Upgrade, which is like a basic test pilot license. I ended up going to Nellis for more than two weeks every two months. Flying in a C-model there and then going back to an A-10A in Baltimore was a challenge. I had two sets of habit patterns. Habit patterns are hard to keep, so I was the happiest guy on this base to see our last A-model go in for modification.”

As the A-10C was being put through its paces at Nellis and modified jets were being delivered, training became a critical issue. “The question became, ‘How do we get the basics?’” notes Marino. The unit will soon have a cockpit simulator with a full visual system that will allow multiship missions and distributed training. But the initial answer was a desktop simulator that uses commercial components and is tailored to the A-10. Baltimore and Battle Creek each have five of the desktop sims.

“The desktop simulator is an outstanding tool for a new system like this,” says Capt. Rich Hunt, the squadron’s weapons officer. “The challenge in the A-10C is to build finger memory since nearly all of the controls are on the throttle and stick. Pilots have to unlearn their previous habits and develop new ones. This business still comes down to flying a jet and employing the weapons.”

A four-flight pilot checkout syllabus was developed by Air Combat Command. The first flight familiarizes pilots with the new throttle and stick and teaches them how to get the
targeting pod into position. The second flight adds training with Maverick, the tactical awareness display, and the moving map. The third flight concentrates on understanding HUD symbology and manipulating the sensor of interest, which is critical for employing weapons. The fourth flight involves flying in a tactical environment. “Once qualified, we like to say the pilots have a license to learn,” says Hunt. “With the entire squadron qualified, we can press forward and start training for the AEF deployment.”

The Baltimore A-10Cs will deploy first this fall, followed shortly afterward by A-10Cs from Battle Creek. “The Hog will never be faster than other jets, but now we can do almost everything else,” notes Marino. “With JDAM, we can hit a pop-up target. We will be doing nontraditional surveillance and reconnaissance. We will go out and check for IEDs in front of a convoy. The Hog was designed to destroy armor columns, and now we look for a group of four or five people in the woods. PE allows us to find and fix the target rapidly. With SADL, target information comes up on the net. We can drop JDAM, 500-, or 1,000-pound bombs and launch Maverick.”

“The change from analog to digital is huge,” says Campbell. “The infrastructure is in the airplane, and the system can accommodate growth. It is better and easier and faster to update. Close air support requires talking to troops on the ground and delivering weapons in close proximity to friendly forces. The A-10C makes us much better at that.”

“Anytime we put troops on the ground, we will need that type of close air support,” Campbell continues. “If we have the sensors, we can perform CAS from 10,000 feet. With the A-10C, we can do battle damage assessment from standoff distances. I can still roll in with the gun or with a bomb if I have to. But now, I have to expose myself to threats only if the situation warrants taking such a risk, not because the aircraft’s capabilities are limited.”

The drawdown of the A-10 is expected to begin in the early 2020s when the F-35 comes online in sufficient numbers. The last A-10 is scheduled for retirement in 2028. Notes Campbell: “We can’t stay around forever, but the Hog has to be viable until it is time to go.”
LIGHTNING STRIKE 2020

BY JEFF RHODES
The execute order is given. The two orbiting pilots fly across the border and point their F-35A Lightning IIs toward a high-value target in enemy territory. Because of the objective’s urban location, minimizing both collateral damage and noncombatant casualties is a priority.

National technical means had provided overhead reconnaissance photos of the objective. The Combined Air Operations Center, or CAOC, in a nearby allied country then tasked an F-35 pilot to capture sensor data and radar and infrared images of the target area. Coming in at night at standoff range and high altitude, the highly integrated air defense system around the city was never able to track the inbound stealthy F-35. The imagery was sent over a secure datalink to the CAOC and was being used for mission planning before the F-35 pilot returned to base.

Meanwhile, Special Operations personnel infiltrated the area and are observing the target from their hiding place. They will clear the F-35s in hot, ready to release weapons at the appointed minute.

The F-35 pilots, using their eight-by-twenty-inch touch screen/voice-activated contiguous display in the cockpit and their wide field-of-view helmet-mounted display, get a God’s-eye view of the entire area around the target. Symbols for friendly and hostile forces are presented, as are potential threats. Confirmation of exactly what is ahead for hundreds of miles has been datalinked to the F-35 by reconnaissance and battlefield control aircraft orbiting over friendly territory.

As the F-35 pilots approach the target, the internal electro-optical targeting system, or EOTS, allows them to see vehicles and troops on the ground from altitudes and distances beyond visual range. The Special Operators then illuminate the objective with a laser. The lead F-35 pilot releases a GBU-12 from the aircraft’s internal weapons bay far afield from the target. The 500-pound bomb rides the laser to a direct hit. The strike video is recorded in the EOTS and is datalinked to the CAOC seconds later for near real-time battle damage assessment.
This scenario is typical of what the F-35 will bring to the future battlefield. But as history has shown, after air dominance is assured and high-value, heavily defended targets are destroyed, the air war invariably comes down to supporting troops on the ground.

The fifth-generation F-35 is designed for the full spectrum of modern warfare. Its stealth allows pilots to sneak in and destroy targets on the first day of the war. When stealth is no longer critical, the Lightning II can carry 18,000 pounds of ordnance on eleven underwing and fuselage stations for air interdiction and close air support missions. When the fighting gets really close, the F-35 has a 25 mm gun for strafing.

This versatility allows the three variants of the F-35 to replace the F-16, F/A-18C, and Harrier, as well as the A-10, the US Air Force’s purpose-designed close air support platform. As the F-35 is fielded in sufficient numbers starting around 2015, the A-10 fleet will be drawn down. By the time the last A-10 is retired in 2028, it will be about fifty years old.

The conventional takeoff and landing F-35A will be produced in the most numbers, with 1,763 planned for the US Air Force alone. Most international operators will also fly this version, eventually pushing total F-35 production to more than 4,000 aircraft. At about 29,000 pounds empty, the A-model is the lightest of the three variants.

The short takeoff and vertical landing F-35B is designed for the US Marine Corps and the Royal Air Force and Navy. A fully loaded B-model can take off on 1,200 feet of AM2 runway matting or from an amphibious assault ship, providing basing flexibility. The F-35C, designed for the US Navy, features larger wings to carry more fuel and provide better low-speed landing approach characteristics to an aircraft carrier.

With internal weapons and no external fuel tanks, the F-35C with 20,000 pounds of internal fuel can fly more than 600 nautical miles to a target and return safely to ship or base. When stealth is not a mission requirement, external tanks extend the plane’s reach even further. The F-35A has a 590-nautical-mile combat radius, while the F-35B, because of its lift fan for vertical flight and its reduced fuel load, can fly a maximum of more than 450 nautical miles to a target with abundant remaining fuel for the return trip. Of course, shorter range missions mean additional loiter time or the ability to carry additional weapons for all variants.

In the F-35 cockpit, the helmet-mounted display, combined with the aircraft’s distributed aperture system, or DAS, alleviates the need for night vision goggles. The DAS gives the pilot total situational awareness 360 degrees around the aircraft. In particular, DAS enables the pilot to see everything on the ground virtually through the structure of the aircraft—essentially providing a transparent floor. In a close air support situation, the pilot can locate and off-boresight target the enemy, come around and release weapons, and thus minimize exposure to ground threats. No time is wasted reacquiring the target after a bombing or strafing pass.

The Northrop Grumman AN/APG-81 active electronically scanned array radar is common to all F-35 variants. The radar, which has an interleaved search-and-track function, allows the F-35 pilot to engage enemy fighters or low-flying helicopters while detecting, identifying, and directing weapons on fixed and moving ground targets. The APG-81 has nearly three times the range of existing radars and provides the pilot with ultrahigh resolution, synthetic aperture radar imagery.

F-35 variants will eventually be certified to carry virtually every 500-, 1,000- and 2,000-pound bomb in the US inventory, including the satellite-guided GBU-31/32/38 Joint Direct Attack Munition series, the laser-guided GBU-10/12/16/24 Paveway series, and Mk. 82/83/84 free-fall bombs. The Lightning II will also carry the INS/GPS-guided 250-pound GBU-39/40 Small Diameter Bomb, the AGM-154 Joint Standoff Weapon, and the CBU-103/105 Wind-Corrected Munitions Dispenser. For air combat, the F-35 carries two radar-guided AIM-120 AMRAAM missiles or heat-seeking AIM-132 ASRAAMs internally, and the heat-seeking AIM-9X externally. By 2020, the AGM-65 Maverick missile, a primary weapon on A-10s, will be out of the inventory, although replacements are being developed.

The General Dynamics GAU-22/A four-barrel 25 mm Gatling-type gun is mounted internally on the left shoulder of the F-35A fuselage. This gun, with a firing rate of 3,000 rounds per minute, is an effective weapon against vehicles and light armor and can produce a mobility kill on tanks. The gun can be carried on a removable centerline pod on the F-35B and F-35C.

The F-35’s contributions to future combat are both strategic and tactical. Its stealth and supersonic speed allow the Lightning II to fight in high-threat environments that the slower, unstealthy A-10s cannot survive. The F-35 also will be dispatched to low- and medium-threat theaters. An array of secure voice, data, and identification/surveillance systems makes the F-35 a veritable flying information node. The rapidly deployable F-35 has range, loiter time, and a large weapons load. It will be available in large numbers for joint US and coalition actions around the world.

Ground forces have one overriding expectation for air support—keep the enemy off their backs. The F-35 will be up to the task.

Jeff Rhodes is the associate editor of Code One.

With internal weapons and no external fuel tanks, the F-35C with 20,000 pounds of internal fuel can fly more than 600 nautical miles to a target and return safely to ship or base.
This chart shows the variety of weapons that can be carried by the F-35. Other weapons can also be carried.
F-22 Raptors from the 1st Fighter Wing set new firsts in February as pilots and personnel took the US Air Force’s fifth-generation fighter from Langley AFB in Virginia to Kadena AB, Japan, and to Nellis AFB, Nevada.
Twelve F-22s and more than 250 airmen from Langley’s 27th Fighter Squadron began arriving at Kadena on 17 February after an 8,000-mile trek. The deployment, scheduled to last approximately ninety days, is part of an air and space expeditionary force rotation to the region. Kadena AB, located on the Japanese island of Okinawa, is the hub of airpower in the Pacific and home to the Air Force’s largest combat wing—the 18th Wing.

Thirteenth Air Force is responsible for F-22 operations while the Raptors are in theater. Lt. Gen. Loyd S. Utterback, 13th Air Force commander, stresses that the deployment is not in response to any specific situation. “The United States routinely evaluates its readiness and repositions forces throughout the Western Pacific to meet its security obligations,” he says. “The F-22 deployment is the latest example of the flexibility that US forces have to meet ongoing commitments within the region.”

“This deployment is a great opportunity for the squadron,” says Lt. Col. Wade Tolliver, commander of the 27th FS. “Not only will we be learning about operating from an overseas location, we will get the opportunity to educate the Air Force and our sister services on the capabilities the jet brings to the fight.”

“This is history in the making,” adds Brig. Gen. Harold Moulton, the 18th Wing commander. “This deployment brings unmatched combat airpower to the Pacific and highlights the importance of the bilateral alliance of promoting peace and stability in the region.”

The 27th Fighter Squadron, the Air Force’s first frontline F-22 fighter squadron, reached initial operational capability in December 2005. Although this is the first overseas deployment for the Raptor, it is not the F-22’s first deployment from Langley AFB. In October 2005, the 27th deployed F-22s to Hill AFB, Utah, where pilots practiced unique flight tactics and dropped inert Joint Direct Attack Munitions. The squadron also deployed to Elmendorf AFB, Alaska, in May 2006 to participate in joint training during Northern Edge exercises.
While F-22s from Langley’s 27th FS deployed to Kadena AB, the base’s other Raptor unit, the 94th Fighter Squadron, set its own precedent by participating in Red Flag exercises at Nellis AFB, Nevada. Fourteen Raptors and almost 200 personnel from Langley were part of the more than 200 aircraft and approximately 5,200 military members from the United States, United Kingdom, and Australia taking part in the training. The Royal Air Force sent Tornado GR.4s, and the Royal Australian Air Force sent F-111C Aardvarks. Other aircraft included B-1 Lancers, B-2 Spirits, F-117 Nighthawks, F-15 Eagles, and F-16 Fighting Falcons.

Red Flag is an advanced, realistic combat training exercise designed for fighter pilots. It is conducted over the vast Nellis range complex, which measures sixty by 100 nautical miles. The training involves air-to-air engagements as well as engagement with ground targets, such as mock airfields, convoys, and other ground-based defenses. Threats also include electronically simulated surface-to-air missiles, antiaircraft artillery, communications jamming, and global positioning system jamming.

The F-22’s debut at Red Flag is a significant milestone for the jet. “The training provided by the Red Flag adversaries is like no other on earth,” explains Lt. Col. Dirk Smith, commander of the 94th FS. “Our pilots are experiencing a tremendous learning curve.”

The F-22 showcased its advantages of stealth, supercruise, maneuverability, and sensor fusion during the exercise. This Red Flag was a first exposure for many participants to the Raptor’s capabilities. For those flying against the new fighter, the experience was often frustrating. “I can’t see the [expletive deleted] thing,” said RAAF Squadron Leader Stephen Chappell, an exchange F-15 pilot in the 65th Aggressor Squadron at Nellis. “It won’t let me put a weapon on it, even when I can see it visually through the canopy. [Flying against the F-22] annoys the hell out of me.”

Lt. Col. Larry Bruce, who commands the 65th Aggressor Squadron at Nellis and regularly flies against the F-22, admits flying against the Raptor can be humbling. “It’s humbling not only because of the F-22’s stealth, but also because of its unmatched maneuverability and power,” he says.

Training with the RAF, RAAF, and other USAF units at Red Flag provided valuable experience for all involved. “This exercise is a great chance for us to learn what sister and coalition forces can do and for them to learn what we’re capable of doing,” Smith says. “The addition of RAF and RAAF players makes the training more diverse and valuable for all pilots involved. Our participation here is not to show off the F-22’s capabilities, but to explore how the Raptor can enhance the overall capability of our Air Force and the coalition forces.”
Planning for the annual Christmas airlift begins in late August or early September. In November, the Firebirds, as the 517th AS is known, hold a fund-raising auction. Bid items range from a framed C-130 print to a week’s use of the squadron commander’s parking spot.

“The squadron spouses, who did the shopping and gift wrapping, spent about $4,000 for the sixty children in the village,” says Capt. Darien Baker, 517th AS navigator flight commander and organizer of this year’s airlift.

“The adults usually get gifts of food, which they always share with one another.” Needed supplies, like a community washing machine and the dog food, are also packed.

Arctic Village is a place of contrasts. Many homes don’t have running water and are heated by firewood. But Arctic Village is a part of the Global Village, and the children e-mail their wish lists from the community center to Elmendorf. “The kids ask for very specific things,” notes Baker. “We received a lot of requests for twelve-packs of Pepsi. MP3 players were very popular. One kid asked for Yu-Gi-Oh! game cards and gummi bears.” The young boy got the cards—and a twenty-pound box of candy.

The two-hour flight from Elmendorf is fairly involved. “We fly north and shoot an instrument approach at Fort Yukon and then go under the weather to get to Arctic Village,” notes Mish. “We follow the Shanlan River below the cloud...
deck to a 4,500- by 70-foot packed snow strip that has lights only on one end. Surprisingly, that is actually one of the bigger strips you’ll find up there.” The flight is conducted under visual flight rules. Being that far north in December, it is civil twilight all the time. “The snow on the ground helps with illumination,” adds Mish.

“This is a major operation,” notes Baker. “The temperature is sometimes fifty degrees below zero on the ground in Arctic Village. We carry two heaters with us to warm the props, and we usually take six maintainers. It is an honor for the maintainers to go, but they are sometimes necessary. We also launch a backup aircraft that carries a work stand and deicing equipment. The backup won’t land unless it is absolutely necessary. We don’t want to have a C-130 stuck there.” The crew spends about three hours on the ground.

Once the villagers know the C-130 is close, they make the two-mile trek to the airport. After landing, the Hercules is unloaded by hand, as they have no forklifts or mechanical loaders. A lone snow machine, a truck-like vehicle that is Arctic Village’s primary means of transportation, is used to haul the gifts and supplies to the settlement. “We are treated like rock stars up there,” observes MSgt. B. A. Lund, chief loadmaster for the squadron, who has played Santa for the past three years. “I make sure I get to ride in the cab of the snow machine going back to the village. The Santa suit isn’t that warm.”

“The kids always perform a skit in the community center for us,” says Baker. “Then we do Santa Claus and hand out the gifts. After that, they prepare a meal for us, usually caribou meat, salmon, or something we don’t normally eat. The flight is really a cultural exchange program between the squadron and the village.” The villagers also make small souvenirs out of caribou antlers and present them to the squadron guests.

Crystal Frank grew up in Arctic Village and is now a college student at the University of Alaska-Fairbanks. In an e-mail to the squadron, she summed up what the flight means to the villagers. “I remember when I was a child, Santa and his airmen would come to visit. We would be so excited that we would dress warm and wait outside until the plane flew over. I remember jumping on the sled on the back of a snow machine and making the long trip to the airport, despite how cold it was. It didn’t matter what Santa brought me. What mattered most was that he came to visit again.”

Baker agreed. “This mission is one of the most meaningful things we do.”

Jeff Rhodes is the associate editor of Code One.

Editor’s Note: The annual Christmas airlift will change somewhat in 2007. The 517th Airlift Squadron is converting from the C-130H to the larger C-17, making landing at the short, narrow strip at Arctic Village problematic. The 176th Wing, the Alaska Air National Guard C-130 unit at nearby Kulis ANGB in Anchorage, makes Christmas flights to several other Alaskan villages and will now take on the yearly flight to Arctic Village as well.
“RED FLAG IS THE TOP EXERCISE IN THE WORLD,” SAYS LT. COL. GEORGES FRANCHOMME, THE DIRECTOR OF OPERATIONS FOR THE BELGIAN AIR FORCE’S DEPLOYMENT TO A RED FLAG EXERCISE LAST FALL. “IT PROVIDES AS CLOSE TO A REAL-WORLD THREAT ENVIRONMENT AS POSSIBLE WITHOUT BEING IN ACTUAL COMBAT.”

BELGIUM DEPLOYS TO RED FLAG

FRANCHOMME, with more than 2,300 hours in the F-16, has attended several Red Flag exercises, which are held several times a year at Nellis AFB, Nevada. “This time, we are the only air force from outside the US participating,” he notes. “In past exercises, we were typically part of a larger deployment of European participating air forces.” The Belgian Air Force contingent at Nellis consists of eight F-16s, four C-130s, and 170 personnel.

Red Flag, established in 1975, aims to maximize the combat readiness, capability, and survivability of participating units by providing realistic training in a combined air, ground, and electronic threat environment. The exercise also offers an opportunity for a free exchange of ideas between forces.

Participating forces, divided into Red (unfriendly) and Blue (friendly) forces, simulate warfare over the vast bombing and gunnery ranges around Nellis. The F-16s and F-15s of the 64th and 65th Aggressor Squadrons at Nellis are the Red force. Visiting units perform together as the Blue forces.

ARTICLE AND PHOTOS
BY ANDY WOLFE
Red Flag 07-01 consists of two equally sized daily launches, one in the afternoon and one in the early evening. Each launch is preceded by element briefings, which include only aircrew members. A later mass brief includes all flying aircrews as well as intelligence and threat operations personnel.

The Belgians hold three separate element briefings—one for an F-16 two-ship formation, one for an F-16 four-ship formation, and a third for a C-130 three-ship formation. The F-16 pilots perform air-to-ground attack missions, and the C-130 crews provide tactical airlift. During the briefing for the F-16 two-ship, the pilots discuss their attack plan in detail from engine start to target ingress.

The mass briefing covers the entire air tasking order and strike operations associated with each launch. After the mass briefing, aircrews are released to prepare for their assigned takeoff times. The afternoon launch starts about one hour later and continues for thirty minutes to get all of the aircraft airborne. Both Red and Blue forces take off from the two main runways at Nellis.

With all of the aircraft airborne, Red air sets up in the western side of the airspace. Blue strikers come in from the east escorted by their high fighter cover, which for this exercise are US Air Force F-15s.
For the next half hour, dozens of fighters, attack aircraft, AWACS, tankers, radar jamming platforms, and other assets perform their roles and execute the battle plan set forth at the mass briefing.

Meanwhile, the plan unfolds in real time on the large video screen in the Red Flag auditorium at Nellis, with dozens of individual tracks of aircraft creating what amounts to an aerial ballet.

After this practice war, the aircraft recover back at Nellis. After an element debriefing, all participants gather once again in the main auditorium for a mass debriefing where the entire battle is replayed on the screen and discussed in detail. From initial element briefings, which started in the late morning, to the completion of the mass debriefing, the entire afternoon launch takes about twelve hours from start to finish.

Lt. Col. Fred Vansina, the flying group commander at Kleine Brogel AB, is the Belgian detachment commander for the first half of the six-week deployment. He flies several Red Flag sorties in F-16s during the exercise, but also takes the time to fly with his air mobility counterparts on a C-130H tactical airlift mission. “The experience of flying evasive maneuvers in a C-130 at 200 feet and landing on an unimproved airstrip leaves a lasting impression,” says Vansina. “I am thoroughly impressed with the tactical side of the C-130’s airlift mission.”

During a particular two-ship air-to-ground mission, the Belgian F-16 pilots conduct a low-altitude ingress attempting to avoid such ground threats as the SA-2, SA-6, SA-8, and Roland surface-to-air missile batteries. Simulated surface-to-air missiles, called Smoky SAMs, give aircrews the look and feel of real SAM launches during the mission. The F-16 pilots counter the threats by dispensing chaff and conducting evasive maneuvers. They also rely on their US Air Force F-15 top cover to deal with the Red Air F-16s as well as F-15s simulating SU-27 Flankers over the target area.

“The Belgian Air Force participates in various exercises every year, but the opportunity to train at Red Flag and make the most of the vast ranges at Nellis is a huge benefit to our operations,” says Franchomme. “Our aircrews and maintenance personnel will take the lessons learned here back to their home squadrons.”

Belgium remains a key NATO ally and plans to fly its F-16s for up to twenty more years. All of the BAF F-16s have been reconfigured to the Mid-Life Update, or MLU, standard. Even though all of the active Belgian aircraft have now received the baseline MLU upgrade, further enhancements are added as the jets go through periodic depot maintenance. The latest of these iterations of the MLU, known as M4, has added such features and capabilities as Link-16 datalink and provisions for the Joint Helmet-Mounted Cueing System and Joint Direct Attack Munition, or JDAM.

With further planned hardware and software enhancements to the avionics and weapon systems, the Belgian F-16 fleet will remain viable for many years to come.†

Andy Wolfe is a flight test photographer for Lockheed Martin.
New Wings For Norway
Norway awarded Lockheed Martin a contract in late February to build service life extension program, or SLEP, kits for its fleet of six P-3 Orion maritime patrol aircraft. The SLEP will add more than 15,000 flying hours to each aircraft, representing up to twenty-five additional years of service. The contract includes the life extension kit, engineering support, and other components and replaces all fatigue life-limiting structure on the aircraft with enhanced design components and corrosion-resistant materials. The Norwegian life extension kit includes the outer wings, the center wing lower surface, horizontal stabilizer, horizontal stabilizer leading edges, and nacelle components. Production will take place at Lockheed Martin in Marietta, Georgia.

Ninth Partner Joins F-35 Program
Denmark became the ninth F-35 partner nation to join the production and support phase of the Joint Strike Fighter program by signing the F-35 Production, Sustainment, and Follow-On Development Memorandum of Understanding on 27 February. Denmark extends its cooperation in the program beyond the current system development and demonstration, or SDD, phase and joins the family of partner nations that will cooperatively develop, produce, test, train, and operate the F-35 Lightning II. Denmark’s work on the program includes advanced composites, communications software, control surface components, and weapon pylons. Denmark joined the JSF program in 1997. In 2002, it became the first European nation to enter the program’s SDD phase.

Third C-5M Super Galaxy Flown
The third fully modernized C-5M Super Galaxy test aircraft was flown for the first time on 9 March from Dobbins ARB, Georgia, after being converted from a C-5A model configuration. This is the third of three test aircraft being used to test and demonstrate the improved reliability, maintainability, and availability of the C-5M. The C-5A fleet has approximately seventy percent of its useful structural life remaining and has been validated as structurally sound by the Air Force Fleet Viability Board. C-5 aircraft that have gone through the Avionics Modernization Program portion of the two-part C-5 modernization effort have logged more than 8,000 flight hours, many of which came in support of Operation Iraqi Freedom.

Small Diameter Bombs On A Raptor
The 411th Flight Test Squadron at the Air Force Flight Test Center at Edwards AFB, California, began integration testing of the F-22 and the GBU-39 Small Diameter Bomb, or SDB, in February. The 250-pound class GBU-39 is a low-cost, standoff, next-generation, precision-strike weapon guided by an inertial navigation system with global positioning system updates. Integrating the F-22’s stealth and speed and the autonomous standoff capability of the GBU-39 enables the Raptor pilot to release an SDB more than sixty nautical miles from the target. The F-22 can carry eight SDBs and two AIM-120 AMRAAM air-to-air missiles in its internal weapons bay. Future F-22 integration tests include SDB separation tests.
VSTOL Observations

A small group of F-35 design engineers came aboard the USS Nassau (LHA-4) on 9 March to observe AV-8B Harrier vertical short takeoff and landing, or VSTOL, operations. Lockheed Martin used the visit to familiarize the F-35B design team with various operational and environmental challenges of shipboard life. Highlights of the team’s visit included touring the ship’s primary flight control, hangar bay, and flight deck during flight quarters and speaking with US Navy and Marine personnel who carry out the everyday maintenance duties on aircraft. The F-35B is the short takeoff/vertical landing variant of the Lightning II to be used by the US Marine Corps and the Royal Air Force and Royal Navy.

Incirlik Rotation Concludes

F-16s of the US Air Forces in Europe began a two-month rotational assignment at Incirlik AB, Turkey, in January, after a hiatus of more than sixteen years. F-16 pilots from the 52nd Fighter Wing’s 22nd Fighter Squadron at Spangdahlem AB, Germany, arrived 3 January. They were replaced when pilots from the 23rd FS arrived on 2 February. More than 650 sorties were flown between the two squadrons. The successful rotational training concluded at the end of February. Access to the Konya AB bombing range was granted by Turkish officials. The weather in Turkey was considerably better than the winter weather in Germany, which improved the quality of the training flights.

First C-130J For AMC

The first C-130J Super Hercules was delivered to an Air Mobility Command active duty unit on 13 March. After accepting the new C-130J, Gen. Duncan McNabb, commander of the Air Mobility Command, flew the aircraft to Little Rock AFB, Arkansas, where it will be operated by 463rd Airlift Group’s 41st Airlift Squadron, the third oldest airlift squadron in the US Air Force. The 41st AS, known as the Black Cats, moved from Pope AFB, North Carolina, as part of the Base Realignment and Closure process and officially stood up at Little Rock on 6 April. C-130Js are currently deployed in two combat theaters and are being flown by both US and allied operators.

Scouts Stand Down

Sea Control Squadron 24 (VS-24) was disestablished at NAS Jacksonville, Florida, on 28 March. The event marked the end of forty-seven years of service as an Atlantic fleet carrier-based anti-submarine warfare squadron. VS-24, known as the Scouts, has been assigned to Jacksonville for thirty-four years. It was the first S-3 squadron to move to NAS Jacksonville when nearby NAS Cecil Field closed in 1997. VS-24 dates back to Bombing Squadron 17 (VB-17) that was established 1 January 1943 and flew the Curtiss SB2C-1 Helldiver dive bomber. The Scouts transitioned to the S-3A in 1976. Since moving to NAS Jacksonville, VS-24 has deployed five times, with the last deployment occurring March 2006 in support of Operation Iraqi Freedom.
Air And Sea Power

Four US fighters fly in formation above the USS Ronald Reagan (CVN-76) during a joint US Navy and Air Force exercise on 16 March: a US Navy F/A-18E Super Hornet aircraft from Strike Fighter Squadron 115 (VFA-115); an F-22A Raptor aircraft from the 27th Expeditionary Fighter Squadron deployed at Kadena AB, Okinawa; an F-15C Eagle aircraft from the 44th Fighter Squadron at Kadena; and an F/A-18C Hornet from VFA-25. The Reagan Carrier Strike Group is under way in the Philippine Sea on a surge deployment in support of operations in the US 7th Fleet area of responsibility.

Martinsburg Firsts

The first C-5A Galaxy assigned to the 167th Airlift Wing, the Air National Guard unit at Martinsburg, West Virginia, made its first training flight from Martinsburg to Newburgh, New York, on 28 March. The unit flew its first operational mission on 10 April when it delivered two Marine Corps CH-53E Super Stallion helicopters and more than sixty Marines supporting Combined Joint Task Force—Horn of Africa to Camp Lemonier, Djibouti. The helicopters will be used for humanitarian assistance, personnel and equipment movement, and noncombatant casualty evacuations. Over the last forty years, the 167th AW has operated fourteen different aircraft, including four versions of the C-130.

Maintenance Awards Presented

Two P-3 units, Special Projects Patrol Squadron 1 (VPU-1) and VP-10, both at NAS Brunswick, Maine, recently received the Avionics Master Chief Petty Officer Donald M. Neal Awards for 2007 for best maintenance department. The awards, presented yearly to P-3 squadrons, are determined by the commander of the Navy’s Patrol and Reconnaissance Group for each US coast. A separate award, known as the Golden Wrench, is presented to the Naval Reserve squadron with the best maintenance department. The Golden Wrench awards are sponsored by Lockheed Martin. Each unit receives a permanent plaque and is allowed to keep the rotating trophy for one year. A pin for each squadron member is also presented.

F-35 SDD Wind Tunnel Tests Completed

Technicians at both the US Air Force’s Arnold Engineering Development Center at Tullahoma, Tennessee, and at the Lockheed Martin Low Speed Wind Tunnel in Marietta, Georgia, completed their final planned F-35 Lightning II system development and demonstration wind tunnel testing earlier this year. More than 8,600 test hours on all three F-35 variants were conducted at Arnold, which concluded testing on 5 February. More than 7,600 hours on all three variants, including ground effects tests with the landing gear down, were completed in Marietta. A total of more than 48,190 wind tunnel test hours on the Lightning II have been completed at eighteen facilities around the world over the past five-plus years. The test cells at Arnold are also being used to test the F-35’s Pratt & Whitney F135 engine.
Former Adversaries Meet

The idea of Russian and US Air Force leaders flying together and exchanging ideas was implausible twenty years ago. But in late March, top leaders from the Russian Air Force visited with leaders of US Air Forces in Europe to discuss cooperative efforts, particularly in the war on global terrorism, and to exchange ideas on interoperability. As part of the contact program, Deputy Chief of Russian Federation Air Forces General-Colonel Aleksandr Nikolaevich Zelin received an F-16 orientation flight at Spangdahlem AB, Germany. Zelin’s flight was preceded by USAFE Commander Gen. Tom Hobbins’ orientation ride received in a Russian MiG-29 in August 2006.

Operation Deep Freeze Successful Again

Ski-equipped LC-130 Hercules and C-17 Globemaster IIs redeployed from Christchurch, New Zealand, after wrapping up a record-setting 2006-07 season of Operation Deep Freeze in late February. LC-130 crews flew 430 missions, moving nearly 11 million pounds of cargo and 1,000 passengers throughout Antarctica. Supporting these air operations at the bottom of the world were the LC-130s and personnel from the 109th Airlift Wing, the Air National Guard unit at Scotia, New York; and C-17s and personnel from the 62nd and 446th Airlift Wings, McChord AFB, Washington. This unique joint and Total Force mission has supported the National Science Foundation and the US Antarctic Program since 1955. It is currently led by Pacific Air Forces.

Hercules Gathering

SSgt. Jason McCann prepares to drop cargo out the back of a C-130H Hercules airlifter as five other C-130 crews follow in formation during a training mission over Camp Ripley, Minnesota, on 3 March. The mission joined aircraft and personnel from the active duty 43rd Airlift Wing at Pope AFB, North Carolina; the 934th AW at Minneapolis-St. Paul Air Reserve Station, Minnesota, and the 440th AW at General Mitchell ARS, Milwaukee, Wisconsin, both Air Force Reserve Command units; and the 133rd AW, the Minnesota Air National Guard unit also based at Minneapolis-St. Paul ARS.

Final C-5 Flight For Dover Reserves

The 512th Airlift Wing’s 326th Airlift Squadron, one of two Air Force Reserve Command flying squadrons at Dover AFB, Delaware, flew its final C-5 Galaxy flight on 10 March. Lt. Col. Louis Patriquin, a pilot with more than 3,000 hours in the Galaxy, commanded the last flight. The 326th AS, which will convert to the C-17, has been flying the C-5 since the first Galaxy was delivered to Dover in 1973. Its sister squadron, the 709th Airlift Squadron, will continue to fly the C-5B. The squadron will eventually convert to the C-5M. The active duty squadron at Dover, the 436th AW’s 9th AS, will also continue to fly the C-5B/M. Dover’s C-5As have been reassigned to other units.
In Memoriam

Test pilot Beryl Arthur Erickson, pilot at the controls on the first test flights of both the B-36 Peacemaker and B-58 Hustler bombers, died 21 December 2006 in Grand Junction, Colorado. He was ninety. He is credited with as many as fifteen first flights of new aircraft models or variants. In 1940, Erickson went to work for Consolidated Aircraft as a test pilot in San Diego, California. He moved to Fort Worth in 1942. By the time he retired and moved to Aspen, Colorado, in 1962, he had logged more than 25,000 flight hours. He continued to fly his own airplane, a Cessna 210P Turbo Centurion, until he was eighty. Mr. Erickson was profiled in the October 1992 issue of Code One.

In Memoriam

Sir Arthur Marshall, who turned a 1920s auto garage business into Marshall of Cambridge, the international aerospace engineering company, died 16 March. He was 103. Among his many accomplishments was the development of a World War II flight instruction syllabus, which led to 20,000 Royal Air Force pilots and instructors being rapidly trained, and an aircraft repair division, which returned more than 5,000 aircraft to service during World War II. After the war, Sir Arthur turned the company into a world-class aerospace engineering firm. Although Marshalls (now Marshall Aerospace) was noted for its air-to-air refueling systems, it is also known for designing and building the droop nose for the Concorde supersonic airliner. Sir Arthur also established the technical center for the RAF’s Hercules and TriStar fleets. He retired from Marshall in 1989.
Tanker Tandem
Two KC-130J Super Hercules tanker crews assigned to Marine Aerial Refueler Transport Squadron 352 (VMGR-352) at MCAS Miramar, California, stagger themselves during a refueling training exercise off the coast of Southern California in February.

Golden Eagle Contract
The Government of South Korea signed a contract with Korea Aerospace Industries in mid-December for approximately fifty additional T-50 and TA-50 Golden Eagle advanced jet trainers. This contract order brings the total number of T-50s ordered by South Korea to more than seventy.

Crosslands 600K
The Lockheed Martin Crosslands Aircraft Training Center in Fort Worth, Texas, commemorated 600,000 instructor training hours in the F-16 on 14 March. Since 1977, Crosslands has provided instruction to all F-16 operators worldwide, including the US Air Force and US Navy. The milestone mark occurred while training Polish students.

Raptor In The Mist
Condensation forms around an F-22 from the Air Force Flight Test Center at Edwards AFB, California, as it is being flown over the 42nd Naval Base Ventura County Air Show at NAS Point Mugu, California, on 1 April.

SECDEF In The Seat
US Secretary of Defense Robert Gates sat in the cockpit of an F-22A Raptor at Langley AFB, Virginia, on 22 February, as he and SrA. Jason Handt, a 27th Fighter Squadron assistant dedicated crew chief, listened to Lt. Col. Dirk Smith, the 94th Fighter Squadron commander, explain the capabilities of the aircraft. Both the 27th FS and the 94th FS fly the Raptor.

Newest Hercules Delivered
The seventh C-130J Super Hercules was delivered to the 143rd Airlift Wing, the Air National Guard unit based at Quonset State Airport, Rhode Island, on 5 April. Lt. Gen. Craig McKinley, director of the Air National Guard, flew the aircraft from the Lockheed Martin plant in Marietta, Georgia, to its new home. The air wing recently returned from a twenty-month deployment to Iraq where its aircraft were used as part of a C-130J joint force deployment.

Golden Eagle Contract
The Government of South Korea signed a contract with Korea Aerospace Industries in mid-December for approximately fifty additional T-50 and TA-50 Golden Eagle advanced jet trainers. This contract order brings the total number of T-50s ordered by South Korea to more than seventy.

Viking Monument
A monument to the Atlantic Fleet S-3 Viking squadrons was dedicated in ceremonies in the Heritage Park at NAS Jacksonville, Florida, on 22 March. The five-foot-by-five-foot, 1,200-pound granite monument, sponsored by Lockheed Martin, is engraved with a depiction of an S-3 and displays the unit insignia and dates of service of Sea Control Wing Atlantic, Sea Control Weapons School, Carrier Tactical Support Center, and each of the eight East Coast squadrons that have flown the Viking since it entered fleet service in 1974.

Alaska Aggressors
Eielson AFB F-16 pilots took to the sky as aggressors for the first time in Red Flag-Alaska history during an exercise in April. Flying with the 64th Aggressor Squadron from Nellis AFB, Nevada, Eielson AFB pilots began the transition to a permanent Alaska-based F-16 aggressor squadron during the exercise. Red Flag-Alaska is scheduled to add its own F-16 aggressors in August when the 18th Fighter Squadron becomes the 18th Aggressor Squadron.

Breaking Ground
Ground was broken 13 April for a new P-3 and C-130 hangar at NAS Brunswick, Maine, which will be closed under Base Realignment and Closure Commission action. Approximately 1,600 people will work in the $123 million facility. The hangar will open in 2009.

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Tanker Tandem
Two KC-130J Super Hercules tanker crews assigned to Marine Aerial Refueler Transport Squadron 352 (VMGR-352) at MCAS Miramar, California, stagger themselves during a refueling training exercise off the coast of Southern California in February.