Code One is accepting nominations for the 2002 Semper Viper Award. The award pays tribute to F-16 pilots demonstrating airmanship skills noteworthy of its namesake, the late Joe Bill Dryden. A selection panel from Lockheed Martin Aeronautics Company evaluates candidates who carry on Joe Bill’s tradition of excellence in airmanship and system knowledge. Candidate applications should be sent to the Code One office before 5 April 2003. Applications should include complete information describing particular missions or outstanding aviation skills demonstrated by the nominee.

See codeonemagazine.com for more information.
One other note, those unidentified coalition forces depicted on pages 11, 17, and 19 are in fact members of Canada's 3rd Battalion, Princess Patricia Canadian Light Infantry Battle Group, which included a reconnaissance squadron from Lord Strathcona's Horse (Royal Canadians) and combat service support elements from 1 Service Battalion. This Canadian contribution departed their home on CFB Edmonton for Kandahar on 1 February. After six months in theater, they have since returned home.

And thanks for the Iron Hand plug. The book seems to be doing well. The authors and I have received numerous compliments. A recent review in The Hook gave it raves.

Tony Casanova
Ontario, Canada

Cover Price
Great job on F-16 Operations in Afghanistan issue, starting with the awesome night cover by Price Randel, LM Aeronautics aviation artist. The Code One layout with interviews, acronyms, and first names of pilots and maintenance guys hit the mark. Stired lightly with a flavor of tankers, F16s, and even some sheep) made the tanks buds want more. Several pilots made the point that quick learning coupled with overall Air Force and Army teamwork with situations where prior training had to be put to the test. The crew resulted in successful missions. Kept up the superb blending of photo viewpoints and upfiring journalism.

Jim Eckland
Fort Worth, Texas

Great Lines
What a superb job on the Operation Enduring Freedom article in the third quarter issue. That was a great piece of writing. One allowed folks who couldn't be there to get a real feel for how things were there and for what a good job our guys did under very adverse circumstances. Great choice of format, using the continuous clips of the guys' own words. I especially liked the comments of Maj. Dino at the bottom of page 29 (I laughed a bunch over that one) as well Col. Dave's closing Area Brief on page 41. Just great lines. In addition, Col. Dave's comment on the F-16 being a real force multiplier because of the limiting factor of tanker availability was something that just hadn't occurred to me before. I guess the Vipers were the only single-engine assets in the theater. What a great machine.

Buck Kramer
London, Kentucky

Special Corrections
In your second quarter 2002 interview with Maj. Gen. John Bradley, under the question, "What other assets did the 10th Air Force have in theater for Enduring Freedom," the special operations aircraft were designated incorrectly. MC-130P should be referred to as Combat Shadow and the MC-130E should be referred to as Combat Talon (in fact, Combat Talon I). The MC-130E Combat Talon I along with the MC-130H Combat Talon II are the aircraft that drop the 15,000-pound Daisy Chain Cutter bombs. The Combat Shadow aircraft do not. As a previous Special Operations loadmaster with several thousand hours flying time on the aircraft mentioned, I thought I needed to set the record straight.

Bill Fowler
Marietta, Georgia

Down In The Weeds
The third quarter 2002 issue is the best Code One ever. The Enduring Freedom issue is even better than the issue covering Allied Forces. I enjoyed reading stories of F-16s down in the weeds, strafing Taliban positions. I would love to see someone get all these F-16s together and publish a book about their experiences. What a book that would be! I would also like to see more photos of F-16s working on maintenance in future issues. Once again, great magazine. I know that the F/A-22 and the F-35 are going to be the bread and butter for Lockheed Martin, but my favorite Code One subject is the F-16. I am thoroughly enjoying working on this jet in the ANG.

Steve Chapin
DCANG
Georgetown, Delaware

History Endured, History Debriefed
"Enduring Freedom Debrief" is an extraordinary and important record of history. Well done.

Gary Edwards
Lafayette, Texas

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ABOUT OUR COVER
Photographer: Todd Taylor went out on an early flight at Sather Air Base, Korea. He shoot his F-16 from the 60th FS of Korea Air Force. Show off their new LANTIRN capability. Photo by Kunishige Shimaoka.

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I appreciate the recognition your fine publication provides to the men and women who serve. Our Citizen Airmen are an integral part of a great and enduring American tradition.

Col. Wayne Conroy
Commander, 419th FW
Hill AFB, Utah

Beyond Invincible

Congratulations on a superb third quarter issue of Code One. "Enduring Freedom Debrie" was one of the finest series of articles I have ever read on air combat. I'll keep this edition forever.

Devoting an entire issue to pilot perspectives on this interesting chapter in American warfare was a great accomplishment. I was fascinated with the different viewpoints of so many units. The specific missions reported from both the ground and air perspective was especially moving. I remember flying over Afghanistan at 10,000 feet on night vision goggles, looking through my targeting pod, and feeling beyond invisible. I'll never forget the brave Americans fighting on the ground. The forward air controllers on the ground were the real heroes of the air campaign. I was proud to be flying one of the finest warplanes in history, the Block 30 AFRC F-16 equipped with SADL, NVGs, and targeting pods. The American performance during Enduring Freedom showed it was a pretty miserable few months to be a terrorist.

Lt. Col. Leroy Dick
944th FW
Lack AFB, Arizona

Awesome Ground

I traveled to New York City with my daughter recently for her thirteenth birthday. While there, I visited Ground Zero. This is quite an awesome site to see. People still place fresh flowers along the fence. The stories and pictures are so moving that there is not a dry eye in the area.

I also took the opportunity to promote the role of the F-16 and the punishment it inflicted on terrorism. I wanted to let the 11 September survivors and heroes know that other heroes out there are fighting justice on those who would terrorize our country. So I presented one of the first firehouses on the scene of the twin towers (one that lost several comrades), a police station, and the "Today Show" with a copy of Code One magazine and a poster of the cover of the magazine, a painting by Price Randel. Everyone was so impressed with the poster and very grateful for all our military is doing to fight terrorism.

As an Army brat and a seventeen-year spouse of a fighter pilot, I know firsthand of the sacrifices our military members make every day. The painting on the cover of the magazine is of an F-16 attack on Afghanistan, which just happens to depict one of my husband's missions (Lt. Col. Chris, page 25). I am so proud of him and all the other men and women who sacrifice so much to defend our country. Many people asked me to thank my husband for what he was doing and expressed their gratitude for all he continues to do. Others said that the military members were always in their prayers.

As I sit and write this letter tonight, our military is again preparing to go off and defend our country. I keep all of them in my prayers and their family members who make sacrifices to support them.

Lori
Fort Worth, Texas

The Big Picture

Thank you for highlighting the overall contributions of the US Air Force to Operation Enduring Freedom. As the commander of the 389th FS, I know a lot about the great contributions of Mountain Home Gunfighters. Because of Code One’s coverage, I now know not only how we integrated into the overall operations but also how superbly the total force operated during OIF. The superior actions of all of the units (Active, Guard, and Reserve) involved created success for the US military in accomplishing the vision of senior Air Force leaders and the President of the United States. Thanks for giving us the big picture.

Lt. Col. Thomas Lawhead
Commander, 389th FS
Mountain Home, Idaho

Letters Expanded

My third quarters issue of Code One arrived somewhat late, but better late than never as they say. That is the reason I’m just now passing on my praise to you for your exceptional Enduring Freedom Debrie articles. They are truly insightful; accordingly, I’ve read the issue several times. With such great articles featured in every issue, I always look forward to reading the accolades posted in the letters section of the subsequent issues. With that said, the pending fourth quarter letter section, which you’ll probably have to expand, should be a real good read.
Letters

Higher, Faster, More Often
The Air National Guard units from Tulsa, Toledo, and Des Moines thank you for the great article on our re-engine program. The combination of Lockheed Martin and Pratt & Whitney has done it again. As a follow-up to your article, I would like to add some notes from our deployment to ONW during fall 2002. The 180th FW took the twelve jets with -229 engines from Toledo to Incirlik AB, Turkey, at the end of August. No spares were needed on the deployment. The airplanes flew flawlessly. The 138th replaced its personnel at the end of September and patrolled the Northern no-fly zone for the month of October. The 138th was the first Block 40/42 unit to do so in ONW and the first to do so in ONW on Iraqi air defense units targeting coalition aircraft in the no-fly zone. The new engines allowed unparalleled employment envelopes of this fantastic GPS weapon. In addition, the 188th used GBU-12s to destroy numerous antiaircraft artillery sites while maintaining standoff ranges.

Viper Strikes
On behalf of all of the Spads of the 457th FS, my sincere thanks for the outstanding briefing of Operation Enduring Freedom in last fall’s Code One. Once again, your staff has done a remarkable job of capturing the essence of not only our mission but also the demanding pace of the Viper continues to be put through around the world.

The opening sentence of the article was spot on: “The success and speed of operations in Afghanistan can be attributed to technology.” I am very proud of the technological advances incorporated in our jets over the past several years. But I am even more proud of the men and women who maintain, ready, and fly our jets, allowing the 361st FW to meet 100 percent of its mission. Your article did a magnificent job of recognizing these dedicated professionals and their remarkable effectiveness.

Finally, the 457th FS is extremely honored by Price Randel’s painting of the cover. “No Sanctuary” set the tone for the entire edition. This work of art will enjoy a permanent and honored place in our squadron.

Lt. Col. Ken Bachelor
457th FS Commander
NAS Fort Worth JRB

Infinite Challenges
I’d like to send my thanks to the entire Code One staff for the exceptional coverage provided on the F-16’s role in Operation Enduring Freedom. The testimonials from members of the 49th FW and the host of other units illustrated the infinite challenges our service members face in conducting operations in that area of responsibility.

The 132nd FW, which replaced the 138th in November, also destroyed several antiaircraft artillery sites with GBU-12s. The 132nd then deployed all twelve jets back to the United States in early December. This entire deployment of more than 100 days was flown without tapping into one spare engine. We had an unheard of zero engine-related discrepancies for the entire deployment. Overall the Block 42 PW-229 coalition flew more than 1,600 flight hours comprising 472 combat sorties.
After a few final checks, the General Electric F404 engine roars to full military power. The T-50 accelerates down the runway, lifts into the air, and joins two ROKAF F-16D chase aircraft. The T-50, with chase aircraft close by, climbs out of sight and to 7,000 feet for preliminary handling tests. Lt. Col. Gwang Je Cho, test pilot for the flight, takes the two-seat advanced jet trainer to 15,000 feet where he conducts more tests, including engine transients. The aircraft reaches a maximum speed of 245 knots and a maximum angle of attack of thirteen degrees. Thirty-nine minutes after taking off, the T-50 lands safely back at Sachon. Cho steps down from the cockpit, smiles, and signals thumbs up. He radiates the restraint of a test pilot: “This was a very enjoyable flight,” he says. “If future flights are as successful as this one, we should have a great advanced jet trainer.”

**Concept To Reality**
No Sun Park, the director and plant manager for the KAI Sachon plant, exudes a little more enthusiasm as he reminds visitors of the significance of the first flight. “That flight marked the transition from concept to reality for the T-50,” he says. “We are now seeing the fruit of years of labor. We believe this airplane has a great future.”

Korea’s military establishment and government view the T-50 program as a critical step in modernizing their air force and nurturing an indigenous aerospace industry. The program originated in the early 1990s when South Korea’s Defense Development Agency and Samsung began studying designs for an aircraft that could function as both an advanced jet trainer and a fighter lead-in trainer, or LIFT. The trainers would replace several aircraft in ROKAF inventory.

**First Raptor Training Squadron**

The 43rd FS was activated as the first F/A-22 training squadron in ceremonies last October at Tyndall AFB, Florida. Col. Mark Barrett, commander of the 325th FW Operations Group, officiated the ceremony in which Lt. Col. Jeffrey Harrigan assumed command. Earlier in the day, the new F/A-22 maintenance training facility was dedicated for the 372nd Training Squadron, Detachment 4, which will be responsible for F/A-22 maintenance training.

**F/A-22 Program Leadership Changes**

Brig. Gen. Richard Lewis and Brig. Gen. Thomas Owen were named to lead the F/A-22 program at Wright-Patterson AFB, Ohio, last October. Lewis, formerly director of the Joint Theater Air and Missile Defense Organization at the Pentagon, now serves as USAF program executive officer for fighter and bomber programs. Owen, formerly system program director for the F-15E, now serves as program system director. Ralph Heath was named executive vice president and general manager of the F/A-22 program at Lockheed Martin Aeronautics Company.

**Dick Johnson Dies**

Richard Lee Johnson, chief test pilot for General Dynamics Convair San Diego Division, died of cancer 9 November 2002 in Fort Worth, Texas. He was the first pilot to fly the precedent-setting variable-sweep-wing General Dynamics F-111, the Convair F-102 Delta Dagger, and the Convair F-106 Delta Dart. He was eighty-five. Johnson’s extraordinary flying career, which encompassed thousands of flying hours in over 300 different aircraft types, spanned over a half-century. He was still a rated pilot at the time of his death.

Johnson was born in Coopertown, North Dakota. An exceptionally talented baseball player, he was a top rated pitcher in the state’s amateur ranks and eventually played on a championship-winning American Legion team. Later, he earned considerable acclaim while pitching for Oregon State University. Following graduation, his skills were sufficient to merit an invitation from the Boston Red Sox farm system where he remained on the active roster until shortly after the United States entered combat in World War II. Johnson enrolled in the US Army Air Corps in 1943. He became a fighter pilot and was assigned to the 57th Group’s 56th FS. Based in North Africa and Italy, he eventually completed 180 missions, primarily while flying Republic P-47 Thunderbolts. For his exceptional combat record, he was awarded the Silver Star, the Legion of Merit, four Distinguished Flying Crosses, and fourteen Air Medals.

Johnson became chief of flight test for fighter development at Wright Field near Dayton, Ohio, after the war. While assigned temporarily to Edwards AFB, California, he piloted the North American F-86 Sabrejet to a world speed record of 680 mph, an accomplishment for which Johnson received the prestigious Thompson Trophy. Four years later, assigned the task of demonstrating improvements in F-86 performance resulting from a new wing leading edge design, Johnson was sent to Korea. While introducing the aircraft to Air Force pilots, he managed to fly seven operational combat missions. By the time of his retirement from the Air Force in 1953, Johnson had logged approximately 4,500 hours in thirty-five different aircraft types, including the rocker-propelled Bell X-1, the world’s first supersonic aircraft. Johnson left the Air Force to become chief test pilot for General Dynamics Convair San Diego Division. Initially flying from Edwards AFB, he later moved to Fort Worth, Texas, where he took over the flight test department in 1969 during the early days of the B-58 Hustler program. He logged thousands of hours in a variety of Convair aircraft during his tenure with the company. Many honors were bestowed upon Johnson during this period, including an Jean C. Kincheloe Award given by the Society of Experimental Test Pilots to honor the single best pilot in their profession. Johnson officially retired from General Dynamics in 1977. He continued to instruct and work as a contract test pilot for a number of aerospace contractors around the United States after retirement.
**Supersonic Sidewinder Success**

The F/A-22 successfully launched an unarmed AIM-9M against a QF-4 unmanned drone last November at White Sands Missile Range, New Mexico, to complete all four Pentagon-mandated flight test goals for 2002.

During the test, F/A-22 test pilot James Brown flew Raptor 07 at supersonic speeds at 24,000 feet and fired on a drone flying at 14,000 feet several miles in front of the aircraft. The missile tracked the target and passed within lethal range to demonstrate Raptor’s short-range missile targeting and launch capabilities. A second AIM-9 live fire test is scheduled for 2003.

**F/A-22 Facilities Program Begun**

Lockheed Martin began a $13.6 million capital investment project late last year in Marietta, Georgia, to support F/A-22 rate production. The project consists of an 8,500-square-foot test facility to test the F/A-22’s fuel system for leaks before flight tests. Any repairs can then be performed inside the building. In early 2003, Lockheed Martin is expected to begin construction on a 30,000-square-foot flight operations facility to prepare the F/A-22 for flight tests, subsystem functional tests, and engine runs. The flight ops facility allows the aircraft to test in and out without having to be towed.

**New Avionics Software Flown**

F/A-22 Raptor 06 flew the first time last November equipped with avionics software Block 3.1.1, an upgrade to increase the aircraft’s avionics capability and stability. These flight tests are an important milestone to support the timely start of Dedicated Initial Operational Test & Evaluation planned for this summer.

**New F/A-22 Avionics Integration Lab Established**

A new state-of-the-art avionics hardware and software installation and testing laboratory, called Raptor Avionics Integration Laboratory, was established at Lockheed Martin in Marietta, Georgia, last October to perform ground-based integrated avionics testing. RAIL will surround the F/A-22 hardware with sophisticated test monitoring equipment, integrate it with the latest avionics software, and then test it under simulated operational conditions. The laboratory incorporates lessons learned from the program’s ongoing developmental flight test program at Edwards AFB, California, which showed that more ground-based testing is needed to ensure adequate avionics stability.

The T-50 supersonic advanced jet trainer is the latest product of a relatively new, but highly successful, aviation industry in South Korea. That industry dates back to the late 1970s when Korean Air Lines began performing depot-level maintenance on USAF aircraft based in the Pacific. Daewoo, Hyundai, and Samsung established similar capabilities soon afterwards. KAI began assembling F-5Es for the ROKAF in the 1980s. Korean industry consistently received high marks for its workmanship and quality. It subsequently won contracts to produce a wide range of components and subassemblies for other aerospace companies, including Lockheed Martin. South Korea began developing its first aircraft, the Daewoo KT-1 Woong-Bee, in 1988. This turboprop trainer flew in 2001, entered service with the ROKAF in 2006, and, as of late 2002, has accumulated more than 10,000 flying hours. In the meantime, Samsung became the prime contractor for the Korean Fighter Program, which involved the production of more than 100 F-16s for the ROKAF. The last of these F-16s are now rolling off the KAI assembly line at Sachon.

"While the T-50 is not the first aerospace project Korean industry has undertaken," explains Park, "it is certainly the most challenging. Designing and developing a modern supersonic aircraft is an enormous task. It requires the efforts of hundreds of engineers and other technical personnel from companies around the world." Those companies include General Electric, BAE Systems, Smiths Industries, Martin Baker, BF Goodrich, General Dynamics, Moog, Honeywell, Litton, Raytheon, and Rockwell.

Lockheed Martin, the primary subcontractor on the program, is responsible for the wing, digital flight control system, and the design of the avionics system. The company also provides substantial technical assistance to KAI.

**Designing The T-50**

The T-50 design balances the conflicting characteristics of performance, cost, reliability, and maintainability. The final shape of the aircraft is the product of the first phase of the program, the preliminary design phase. Engineers conducted configuration trade studies, wind tunnel testing, and design optimization in this initial stage. Predicted operational use sized the structure based upon the required service life of the aircraft. Engineers then created specifications for major subsystems and components. Suppliers for these systems were selected based upon the best combination of cost and performance. Additional trade studies determined cost benefits for potential manufacturing methods and assembly sequences. A detail design phase followed preliminary design. In this second phase of the program, which began in the summer of 1999, engineers generated the drawings needed to build parts, tools, assemblies, and installations. "The challenges of this second phase of the program were staggering," notes Park. "We had to produce detailed plans for more than 12,000 parts, assemblies, and installation—all in twenty months. Our KAI design teams successfully met the drawing release schedule. The number of drawing changes required because of interference or altered requirements was also very low compared with similar programs."
Advanced computer-aided design and manufacturing was a key factor in the success of the program. "We took advantage of all of the computerized tools available," says Park. "We did not have to build a metal mockup for anything. This airplane was 100 percent computer-aided design and manufacturing from the start. We also used concurrent engineering. For example, as the structural engineers designed the bulkheads, the manufacturing engineers designed the tools needed to manufacture the bulkheads. We made changes early in the design to improve how the airplane would be manufactured. The center fuselage began as a three-piece assembly, like the F-16. For manufacturing reasons, we changed it to a two-piece assembly. The change saved weight and simplified the manufacturing process. We could make this change because we worked with a digital design process to design the airplane and its manufacturing process at the same time."

A critical design review marked the completion of the detail design. The review verified that the design was mature and that the airplane's predicted performance would meet all of the requirements established by the BOKAF. Final assembly for the first full-scale development aircraft began in January 2001 when the forward, center, and aft fuselages along with the tail were mated together for the first time. KAI is building six FSD aircraft—four flying prototypes and two structural test vehicles. Structural testing began on the test vehicles in January 2002. The first (flying) T-50 rolled off the KAI production line in mid-September 2001. KAI conducted an official rollout ceremony at Sacheon six weeks later.

Designed For Training
From above, the T-50 looks much like a two-seat F-16. A bubble canopy, blended wing/fuselage, and the general planform shape are similar. With a length of forty-three feet and a wingspan of thirty feet, the T-50 is about four feet shorter than an F-16. The control surfaces and tails are larger relative to the T-50's smaller size. The extra area improves handling characteristics at lower speeds and makes the aircraft easier to land. Other distinguishing characteristics include a canopy bow that provides additional birdstrike protection; a narrower, more streamlined nose that corresponds to smaller radar requirements; and larger landing gears that absorb forces produced by higher sink rates (the vertical speed at which the airplane lands).

The most distinctive features of the T-50 are its twin side-mounted inlets that direct air to a single General Electric F404-GE-102 engine—the same basic engine used in the F-18 Hornet. The afterburning engine produces 17,700 pounds of thrust, giving the aircraft an excellent thrust-to-weight ratio. The maximum takeoff gross weight is 29,000 pounds and the maximum speed is Mach 1.5. The service ceiling is 48,500 feet. The design load factor is eight gs; the trainer airframe is designed for a 10,000-hour service life (8,300 hours for the lead-in fighter trainer version).

The T-50 has an onboard oxygen generating system, which simplifies maintenance tasks and reduces the amount of necessary ground equipment. A triple-redundant electrical system increases safety. Relaxed static stability and 

Supersonic AMRAAM Success
The F/A-22 Raptor completed a key flight test goal last November by successfully launching a radar-guided AIM-120 AMRAAM to intercept an AQM-37 unmanned drone while both aircraft and target flew supersonic. During this first-of-a-kind test, Maj. James Dutton launched the unarmed missile from the Raptor at 35,000 feet above the Pacific Missile Test Range to the target approaching from the front at 50,000 feet. Post-flight analysis showed the AMRAAM passed within lethal range of the drone modified to emulate the radar cross section of a small conventional fighter aircraft. The AMRAAM was equipped with telemetry and GPS instrumentation to help determine missile accuracy.

Expanding F/A-22 Envelope
The F/A-22 met some of the last flight envelope expansion requirements last fall to begin pilot training for the upcoming Dedicated Initial Operational Test & Evaluation test program. The Air Force cleared the F/A-22 to fly at Mach 2 and above 50,600 feet and to perform such extreme maneuvers as 9-g turn while flying subsonic at altitudes above 10,000 feet. Developmental flight testing continues at Edwards AFB, California, to further expand the flight envelope needed for DIOT&E.

Raptor 08 Readied For DIOT&E
F/A-22 08 has successfully completed the modification and upgrade at Lockheed Martin in Palmdale, California, to begin Dedicated Initial Operational Test & Evaluation in early October. Raptor 08 is the first of three F/A-22s scheduled to undergo DIOT&E readiness modifications at Palmdale. Based on lessons learned from the ongoing developmental flight test activities, Raptor 08 underwent a series of structural and electrical system modifications to support unique operational profiles as various speeds, altitudes, and angles of attack. Raptor 10 and 11 are being modified in Palmdale. Raptor 07 underwent DIOT&E modifications at Edwards AFB while Raptor 09 was upgraded at Lockheed Martin in Marietta, Georgia.
First Raptor Delivered To Nellis

Lockheed Martin delivered the first F/A-22, Raptor 12, to the US Air Force Air Warfare Center in early January following the signing of formal acceptance by US government officials. The delivery also marks the first F/A-22 delivery to Air Combat Command. The aircraft is to be flown to the 422nd Test and Evaluation Squadron at Nellis AFB, Nevada, where it will initially be used to teach operational test pilots how to fly the aircraft safely and maintain personnel to how to repair it effectively. AWG pilots will eventually use Raptor 12 and the other seven F/A-22s assigned to the unit to test the tactics, techniques, and procedures for the entire Combat Air Forces. They will also be used to train the initial cadre of Air Education and Training Command instructor pilots stationed at Tyndall AFB, Florida.

Raptor 11 Delivered

The last dedicated initial operational test & evaluation F/A-22 Raptor 11, was delivered to the US Air Force last November to complete the five ship fleet of four operational jets plus a spare required by the Air Force for DIOE. The aircraft was flown to the Lockheed Martin in Palmdale, California, to support DIOE pilot training scheduled to begin in February at the Air Force Flight Test Center at Edwards AFB.

First F/A-22 For initial Operational Testing Delivered

The first F/A-22 Raptor purchased with production funds was delivered to the Air Force Flight Test Center at Edwards AFB, California, last October. The aircraft, Raptor 10, is a Production Representative Test Vehicle. It was flown to Lockheed Martin in Palmdale, California, to be ready to support F/A-22 dedicated initial operational test & evaluation scheduled to begin this year. Once at Edwards, the aircraft will be assigned to the Air Force Operational Test & Evaluation Center, Detachment 6, serving alongside Raptors 08, 09, and 11 and demonstrating the Raptor is suitable for operational use.

The aircraft is designed to have the performance needed to support the load-in fighter training missions. The LIFT version of the aircraft features a Lockheed Martin APG-67 multimode fire control radar, a modified General Dynamics M61 20mm in-line gun, a weapons management system, and seven hardpoints for carrying a variety of air-to-air and air-to-ground weapons. (The standard T-50 has no radar or internal gun.)

Structural Testing

The T-50 structural ground test program, which began in January 2002, includes ground vibration tests, full-scale static test, and full-scale durability test as well as several other component tests. The ground vibration tests measure the dynamic frequency characteristics of the airframe structure and validate years of complex analysis. The full-scale static tests demonstrate that the structure can withstand the design loads with no detrimental deformation at limit load or rupture at ultimate load (1.5 times the limit load). The full-scale durability tests demonstrate the airframe structure will not fail from fatigue cracking for twice the predicted service life of the most severe predicted usage for the LIFT version, which is more than 8,300 equivalent flying hours. Durability testing for the second lifespan of the aircraft is scheduled to be completed in mid-2004. Vibration and static testing will be completed in fall 2003.
Flight Testing

ROKAF and KAI formed a combined test force to plan, manage, and conduct the flight test program, which is scheduled to last through September 2005 when the production phase of the program begins. "KAI is using a US model to conduct flight tests," notes T.H. Ha, deputy chief of the T-50 Combined Test Force and the flight test director for KAI. "We based our flight test plan on the F-16 and then modified the plan to fit our needs."

The first T-50 aircraft will be used mostly to expand the envelope and to evaluate handling qualities. The second aircraft will be used for stability and control testing. The third aircraft, the first T-50 LIFT version, will be used to evaluate avionics systems. The fourth aircraft (another T-50 LIFT version) will be used to test the radar, various weapons, and other loadings. The flight test program first establishes an operational flight envelope. Afterwards, T-50 subsystems and capabilities, such as the radar and external weapons carriage, go through development and integration testing. Detailed test plans undergo extensive KAI and ROKAF review for technical and safety considerations.

The results of the flight tests are analyzed by KAI and ROKAF and incorporated into the recommendations each party makes for the final certification of the T-50 for operational use.

"This flight test program was set up to start more slowly than it would have started in the United States," notes Tom Ryan, a Lockheed Martin senior technical manager in Korea. Flight testing a jet aircraft is something relatively new for Korean industry personnel, so they have a steep learning curve. "New relationships have to be established between KAI and ROKAF in a combined test force environment," he continues. "Relationships between the military aviation and the aerospace industry are already in place in the United States. The T-50 flight test program is being conducted on a base where the 3rd Air Wing carries out a training role. The ROKAF generates a lot of training sorties. Commercial air traffic has eight flights in and out of Sacheon every day on top of that. So scheduling is an issue. Weather is a factor here as well."

Ryan is one member of a team of Lockheed Martin employees working on the T-50 program at Sacheon. "We perform two specific functions for the program here," says Craig Lawrence, a flight test engineer on the program. "One is technology transfer. We're here to assist KAI engineers to plan and conduct the flight test program. Our other function is to help the program run efficiently. We're here to help them maintain the schedule."

The technical assistance from Lockheed Martin has been invaluable. "My relationship with Tom Ryan and with other engineers from Lockheed Martin has helped us to be successful," says Ha, who was in charge of KF-16 acceptance flight testing before transitioning to the T-50 program. The team effort is paying off. "The airplane is showing good performance and flying as expected. The problems we've experienced are typical early development problems. And that's why we do flight testing. Not all design issues are visible with computer modeling and wind tunnel testing. We're finding problems and fixing them before we go into production."

As the flight test program progresses, the developmental test flights will incorporate more and more operational testing. "This testing, planned and managed by the ROKAF, will determine that the T-50 satisfies the operational requirements for a primary jet trainer and an advanced fighter lead-in trainer," explains Col. Hee-Woo Lee, the director for T-50 development at the ROKAF System Program Office at Sacheon. "Aside from test flights, the ROKAF will also assess the suitability of the T-50 integrated logistics support capabilities. In other words, we're evaluating how the airplane will be maintained. These evaluations cover technical publications as well."

"We're testing an advanced jet trainer, the T-50, and an advanced fighter jet, the F-16," explains Lawrence. The first T-50 flew for the first time on 20 August 2002. The second T-50 flew on 8 November. The two T-50 LIFT prototypes are scheduled to fly in late summer 2003. "The T-50 LIFT has a fire control radar and a 20mm internal gun," Lawrence continues. "We will conduct weapon separation tests on the T-50 LIFT. About sixty percent of the flight test program is geared toward the fighter lead-in role. We could finish the testing for the advanced trainer version in eighteen months. Adding a radar, gun, weapons, and all of the related avionics significantly increases the size, scope, and complexity of the flight test program."

Four test pilots are currently active on the T-50 Program. Ryan is one of them. All of them are recruited from the ROKAF. "Pilots volunteer for the assignment," explains Cho, who has been on the T-50 program since 1999. "Because of the T-50's importance to ROKAF and to South Korea, we are honored to be chosen to fly for the program."

F-16 Units Receive DoD Maintenance Awards

The 310th FS, one of two F-16 squadrons assigned to the 31st FW, Aviano AB, Italy, and the 354th FW, assigned to Eielson AFB, Alaska, were two of six units awarded the 2002 Secretary of Defense Maintenance Awards at the DoD Maintenance Symposium and Exhibition in Reno, Nevada. They were awarded for making the most significant weapons systems and equipment maintenance contributions over the past year within the DoD. They join fourteen other T-50 units recognized in the eighteen-year history of the award.

NCO Captures Aircraft Generation Award

SM1gt. Eric Trueth of the 20th FW at Shaw AFB, South Carolina, was awarded the 2002 Gen. Lew Allen, Jr., Trophy for leading more than 245 airmen in maintaining the squadron's thirty F-16s to produce 5,329 sorties for more than 8,300 flying hours. As the sortie generation superintendent of the 78th FS, his leadership enabled the squadron to generate the large number of sorties from a limited number of airframes while sustaining a thirty-eight-aircraft utilization rate for three months. Nineteen aircraft are the standard. The award, named in honor of the tenth chief of staff of the Air Force, recognizes outstanding job performance, job knowledge, proven leadership, and direct sortie involvement as well as other military qualities.
Hill Pilot First To Log 5,000
Lt. Col. Michael Brill of the 419th FW at Hill AFB, Utah, became the first pilot in the world last November to log 5,000 flying hours in the F-16. His flying hours equate to 1,750,000 miles—enough to circle the Earth seventy times. Brill, a full-time Reserve pilot, scored the milestone while training for high-altitude delivery of laser-guided bombs. Other hours were earned in three tours of Operation Northern Watch, two for Operation Southern Watch, and one for Operation Enduring Freedom. During those operations, Brill accumulated 122 combat flight hours. He currently serves as operations officer for the wing’s 666th FS. He was also the first pilot to amass more than 4,000 total flying hours in the F-16 in August 1998.

Double 4K At Tucson
Lt. Col. Robert McCutchen, commander of the 56th Operations Group Detachment 1 and senior Air Force advisor to the 162nd FW, became the first active duty Air Force F-16 pilot to surpass the 4,000-hour mark last October in a hour-long sortie with Lt. Col. Nick Anderson of the 152nd FS in Tucson, Arizona, who became the first ANG pilot to achieve 4,000 hours in the F-16 last spring. The combined 8,000 flying hours between them establishes the most hours for a two-ship flight. The pilots are two of only three in the US military to fly more than 4,000 hours in the F-16.

KAI is planning to hire two test pilots by mid 2003. "These pilots will most likely be ex-ROKAF pilots," says Ha, who will be involved in the selection. "Experience and a good kind of relationship with the ROKAF are important criteria for selecting a company test pilot. ROKAF rotates test pilots through this program. Cho, for example, leaves this year. He takes with him most of the flight test experience and the historical information associated with the flying. Dedicated KAI test pilots will provide continuity and corporate knowledge for the program. Eventually, the company test pilots will become the senior test pilots on the program and will convey their knowledge to ROKAF test pilots new to the program."

More Than An Airplane
The ROKAF, like many air forces around the world, uses a wide variety of aircraft to train its fighter pilots. In Korea, students progress from the prop-driven Cessna T-41 Mescalero, to the supersonic jet-powered Cessna T-37 Tweet, and then to the supersonic Northrop T-38 Talon and the supersonic Hawk Mk 67. They then proceed to the F-5 before finally entering operational conversion training, which takes place at the operational units. Most of these training aircraft are very old.

"The ROKAF plans to replace all of these aircraft with two" says Park. "The T-50 takes students from advanced jet training to actual operational type training missions in a single type of aircraft. Reducing the number of aircraft used in our training fleet makes obvious sense because it lowers logistics and support costs. However, the training system associated with the T-50 can decrease training costs even further.

Lockheed Martin Aeronautics Company is analyzing the training requirements for different nations around the world to see how a T-50 syllabus can fit into their training programs and to see how much time and manpower a T-50-based training system can save. "You have to look at how much an air force spends to graduate a pilot from a flight academy and award him or her first wings," says Park. "The T-50 addresses training costs systematically. A pilot can fly from an initial training transition from a T-38 or a Hawk to an advanced fighter like the F-16. The T-50, with its modern cockpit and supersonic performance, is much closer to an advanced fighter like the F-16 or the Joint Strike Fighter. The T-50 familiarizes students with the weapons system and reduces the conversion time to the actual fighters. For a typical conversion course for the F-16, for example, our training system can save as much as thirty-five flight hours of flight time per student. The F-16 units can, in turn, use that extra thirty-five hours more effectively, say for tactical training.

"The T-50 should be viewed as a training system," Park continues. "The system includes cockpit trainers, maintenance trainers, computer-based training, simulators, a training management system, and a ground training scoring system, to name just a few of the components. We even have training systems associated with the portable maintenance aid we use to identify and fix aircraft problems on the T-50."

As more and more air forces look to commercial approaches for their training requirements, the T-50 stands out as one of the most viable and concrete alternatives. Air forces around the world want a total package for training," says Park. "They don't want to buy an airplane and then have to turn around and develop a training syllabus and training system themselves. They want a complete package. While the airplane is the most visible portion, customers will be just as impressed by the entire training system."

Fresno’s High-Hour F-16
Two F-16s of the 144th FW of the Fresno, California, ANG surpassed 5,000 hours in flight last October to join the ranks of only three other F-16C/Block 25 aircraft to reach that mark. The two F-16s make a total of five to surpass 5,000 hours in the ANG. The high flying time is attributed to Noble Eagle taskings, in addition to the wing’s previous NORAD commitments.

The initial ROKAF procurement for the T-50 is approximately 100 aircraft, with a potential of another 200 to replace the ROKAF F-5s. KAI and Lockheed Martin project potential sales of as many as 600 aircraft worldwide. "We think the T-50 will become one of the world’s premier training systems," concludes Park. "That was one of the objectives we had for the airplane when we designed it. The first flight last summer was just one step on the path to success."

Erik Hehn is the editor of Code One.
KUNSAN
F-16 OPERATIONS AT KUNSAN AIR BASE, KOREA

A nondescript airliner dubbed "the Patriot" lands at Kunsan Air Base, Korea, every Thursday to drop off about sixty fresh Air Force personnel at the Wolfpack—the 8th Fighter Wing. The aircraft, a charter, stays for an hour or so and takes off with an equivalent number of Kunsan veterans. Those arriving appear jetlagged from their fourteen-hour flight to Korea via Seattle, Washington. Those leaving say heartfelt goodbyes to friends. Officers at the base line up to welcome the newcomers and to thank those departing for their service. Newly arrived personnel destined for the 80th Fighter Squadron, one of two F-16 squadrons at the base, collect on one side of the ramp. An informal serenade ensues.

BY ERIC HEHS

Beside a Korean Wasserfall one bright and sunny day.
Beside a shattered Sabre jet a young pursuer lay.
His parachute hung from a nearby tree, he was not yet quite dead,
So listen to the very last words the young pursuer said.
"I'm going to a better land where everything is bright,
Where whisky flows from telephone poles, play poker every night.
We haven't got a thing to do but sit around and sing.
And all of our crew are women. Oh death, where is thy sting?"
"Beside a Korean Wasserfall" and many other songs of varying degrees of decorum will be drilled into the memory of the newcomers in the days and weeks to come as they gather together for beers in their squadron hooch on Friday nights. (Hooches are small housing units converted into lounges or party shacks.) Those assigned to Kunsan face twelve months at one of the last truly remote assignments in the US Air Force. The small base, on the southwest coast of Korea, has no space for families. Whereas Osan Air Base, a much larger base about 120 miles northeast and very close to Seoul, gives officers the option of bringing their families, all US military personnel live at Kunsan without spouses or children. Their squadrons, therefore, become extended families.

Without the demands of family, pilots, maintainers, and other personnel have little to distract them from the mission. Col. Scott West, the operations group commander of the 8th FW, sums up that mission: "Defend the base, accept follow-on forces, and take the fight north. Those eleven words make it simple for everyone on base to understand why they are here."

PHOTOS BY KATSUHIKO TOKUNAGA

F-16s Cover NATO Summit
F-16s and maintenance personnel from the 31st FW at Aviano AB, Italy, and the 52nd FW at Spangdahlem AB, Germany, deployed to the Czech Republic last November to assist in air defense over Prague during the 2002 NATO summit—an example of the interoperability and security cooperation existing between NATO allies.

Hill Pilots Set Four-Ship Record
Four US Air Force Reserve pilots from the 419th FW at Hill AFB, Utah, collectively set a new world record 7 December—they logged the most flying hours for a four-ship of F-16s during a combat training mission. Lt. Col. Mike Brill posted 5,008 hours, Col. Ben Bartlett posted 3,122 hours, Lt. Col. Gary Basich posted 2,877 hours, and Maj. Bill Lyons posted 3,024 hours for a combined total of 14,031 hours. The record was previously held by four pilots from the 162nd FW of the Tucson, Arizona, ANG who logged 13,041 hours flying together. The record for the most flying hours experienced by active duty pilots belongs to four pilots of the 62nd FS, 56th FW, Luke AFB, Arizona, who combined 12,699 hours together in a training mission last June.

Montana Wing Heads Home
Capt. Jason Green, an F-16 pilot from the 120th FW of the Montana ANG in Great Falls, puts on his helmet before flying a mission supporting Operation Southern Watch last fall. The wing left Prince Sultan AB, Saudi Arabia, the last week of October after being deployed as part of the 188th EFS. It is being replaced by the 188th FW of the Arkansas ANG in Fort Smith.

F-16s Take On Rafales
Four MLU F-16s from 10 Wing at Kleine Brogel AB, Belgium, deployed to Landivisiau Naval Air Station in Bretagne, France, last October for dissimilar air combat training against Dassault Rafale F1s from 12 Florilice. The training, a first between the F-16s and the Rafales, began with four F-16s versus two Rafales in a beyond visual range scenario and ended with two F-16s versus one Rafale in a visual scenario. The two F1s, the first of 220 aircraft ordered by France, are primarily used as carrier-based air defense on the Charles de Gaulle.
**F-16 CCIP Mod Completed**

The first Phase I A Block 50/52 F-16 modified under the Common Configuration Implementation Program was delivered to the 57th FW at Nellis AFB, Nevada, in early December where it will undergo follow-on testing and evaluation. Phase I A incorporates the APX-113 air-to-air interrogator, two new color multifunction displays, and software for the high-speed anti-radiation missile targeting system pod. Phase II will be fielded in July 2003; Phase III, beginning in 2005, F-16s from the 389th FS at Mountain Home AFB, Idaho, are next in line to receive CCIP.

The 389th will be the first operational squadron to convert to CCIP. The aircraft are being modified at the Ogden Air Logistics Center, Utah, the prime depot for the F-16. Modification kits and field support are provided by Lockheed Martin Aeronautics Company. See Code One Fourth Quarter 2002 for more information on CCIP.

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**Belgian F-16 Pilot Goes To Space**

Lt. Col. Frank De Winne, a former F-16 pilot with the Belgian Air Force, returned to Earth last November after an eleven-day stint on the International Space Station. He is the second Belgian, but most likely the first F-16 pilot, to have gone to space. De Winne flew into orbit with Russians Sergei Zaletin, Soyuz mission commander, and Yuri Lonchakov, Soyuz flight engineer, on the first-ever flight of the new Soyuz model TMA and returned in the old TM-34 Soyuz, which had been attached to the Space Station the last six months as an emergency return vehicle. While in space, De Winne (on left) performed several experiments with a newly installed glovebox container for conducting research in microgravity.

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**MIG-16s Over Afghanistan**

F-16s from 312 Squadron at Volkel AB of the Royal Netherlands Air Force arrived at Manas AB in the former Soviet republic of Kyrgyzstan last October to patrol the skies over Afghanistan in Operation Enduring Freedom. They are part of the European Participating Air Forces deployment, which also includes the air forces of Denmark and Norway. All EAPF jets fly the close air support role enabled by the LANTIRN targeting pod and GBU-12 laser-guided bombs added with the Mid-Life Update. Manas is also known as Ganci AB, named after New York Fire Chief Peter J. Ganci, Jr, who died in the 11 September attacks. During the operation, EAPF F-16s were occasionally identified as MIG-16s by the Kyrgyz air traffic controllers.

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**Those assigned to Kunsan face twelve months at one of the last truly remote assignments in the US Air Force.**
Defend The Base

A tall hill called Big Coyote provides a complete view of the base from its southern tip. A twisty gravel road takes visitors to the top, which is fortified with machine gun nests and a howitzer. Patriot missile batteries are visible below. "If the North invades," explains Capt. Jason Hokaj, an F-16 pilot from the 80th FS, "we can cut down these trees to have a clear shot at enemy forces coming across those rice fields to the east."

Hokaj turns north and points to a razor-wire fence that runs along the coastline and marks the western perimeter of the base. "Rumor has it that North Koreans being trained for their special forces have to touch that fence to graduate," he notes. The story carries more weight than the typical urban legend: mini submarines from North Korea run aground and get entangled in fishing nets off the South Korean coast with a disturbing regularity.

"I don't doubt that the fence story is true," says Lt. Col. John Fyfe, who commands the 80th FS. "The South Koreans are always uncovering special forces operations in the country. I'll read about an infiltration from the north in the press every couple of months. I haven't been here an entire year, but I have already seen two North-South altercations. When I first arrived, the South Koreans sank a North Korean boat that was in South Korean waters. A couple of months ago, the North Koreans sank a South Korean boat. The tension here is a lot higher than most places we can be stationed."

"Kunsan is like a deployed location near a front line," Fyfe continues. "The demilitarized zone, the dividing line between North and South Korea, is only 100 miles north from Kunsan, about fifteen minutes in a jet. Base defense plays an important part of every exercise we take part in."

Accept Fellow-On Forces

Few air bases have the experience Kunsan has in accepting new forces. Those stepping off the weekly Patriot are in-processed faster than newcomers.
Poland Selects F-16

The government of Poland declared the advanced Block 52 F-16 aircraft the winner in the fighter competition to supply the Polish Air Force with forty-eight multirole aircraft. The purchase, announced in December, also includes advanced US weapons, US air force training, and long-term support. The F-16s are to be delivered between 2006 and 2008. Poland will become the ninth European country to fly the F-16, joining a NATO force of more than 1,000 other F-16s throughout the region. It will also become the twenty-fourth country to select the F-16—and the first former Soviet bloc country to buy US weapons. Polish Prime Minister Leszek Miller received an F-16 orientation in Warsaw at the conclusion of a ceremony recognizing the F-16 selection in early January.

Greece Gets First Advanced Block 52 F-16

The first of sixty advanced Block 52 F-16s ordered by Greece was accepted by the US government on schedule last October, thirty-one months after the letter of offer and acceptance was signed and only twenty-eight months after the contract was awarded. The Hellenic F-16, which involves substantial development effort, is being produced on a compressed schedule to meet customer requirements. The first aircraft will remain in Fort Worth until early 2003 to provide hands-on maintenance training, to check out new support equipment, and to validate technical manuals. Greece has ordered a total of 140 F-16s in three programs.

Second T-50 Flies

A second T-50 Golden Eagle completed its first flight last November in South Korea. The aircraft, the second full-scale development aircraft in the flight test program, had been undergoing ground checks since completing assembly last May. The first T-50 flew in August 2002 and reached its operational ceiling of 40,000 feet last November. En route to its operational ceiling, T-50 No. 1 climbed to an altitude of 35,000 feet where throttle transients were performed. At 40,000 feet, the aircraft accelerated to Mach 0.6 where it performed flutter and stability control tests.

at other bases are shown where to park. “Everything is focused on getting people on board within hours of getting them off the plane,” notes F-16. “At other bases, the pre-processing interviews and training classes can take weeks. The local checkout here happens very fast. The squadron has your full attention within a day of arriving. You don’t have to buy a house or rent an apartment here. You don’t have to enroll kids in schools, turn on the utilities, or get a phone. You can focus on the mission a lot sooner.”

Taking off on follow-on forces also means the 6th FW has to be prepared to accommodate five or more additional squadrons, says West. “This means doubling up on rooms, erecting temporary shelters, and dealing with more aircraft on our ramps.”

The commanders of the two squadrons at Kunsan (the 51st FS Panthers and the 80th FS Fists) decide which unit will get which pilot before he or she arrives. (Yes, Kunsan has female F-16 pilots.) “We try to balance the experience levels between the two squadrons and assign them equivalent instructor pilots, weapons officers, and night-vision qualified pilots. We send majors and more experienced pilots to our operations support group where they can support wing-level planning.”

Kunsan is often the first operational F-16 assignment for newly minted F-16 pilots. “We have about eleven lieutenants in each squadron right now,” West explains. “That’s a large number. Kunsan is both a good deal and a tough assignment at the same time for these pilots.” The Air Force won’t take pilots out of the cockpit until they are experienced, which is defined as 500 flying hours in a fighter. A pilot will accumulate more than 500 flying hours in a typical three-year first assignment. So they then will be eligible for a Tony assignment.

Upon arriving, and after in-processing, new pilots get an introductory briefing from the wing commander (called the Wolf). The briefing includes a history of the Korean peninsula and the Korean War. More recently, new-comers take a bus north for a tour of the DMZ. They get detailed briefings on war plans. Pilots new to the Black
Several pilots in the Republic of Singapore Air Force exceeded the posted speed limit last November on a runway outside Tengah Air Base. Singapore’s main fighter base. They weren’t driving sports cars or riding superkites, though. They were flying Block 52 F-16s. Local police officials simply stood by and watched as the pilots zoomed by. These rare roadway activities are part of a runway exercise conducted every five years by the RSAF so pilots can practice emergency takeoffs, touch-and-go, and landings.

The event provides useful insights to the specific operational requirements of Singapore’s airpower. For starters, the island republic is very small. Located about one degree north of the Equator and at the southern tip of the Malay peninsula, Singapore has a landmass that measures forty kilometers long and twenty kilometers wide. The island is about three and one-half times the size of Washington, D.C. Still, it accommodates five airfields with close to 200 combat aircraft, three naval bases with submarines and missile strike craft, and a highly mechanized army of more than 300,000 regulars and national servicemen who can be recalled in less than six hours. Combined, these forces make Singapore one of the most densely defended countries on Earth.

The scarcity of land underscores the importance of public roads that can be turned into emergency runways—a logical option to enhance the sustainability of RSAF flight operations and its operational tempo. Converting highways to runways allows more aircraft to be launched and recovered quickly. The RSAF lays out three objectives for the exercise: to hone its readiness and ability for wartime contingencies when its bases are temporarily incapacitated; to exercise support procedures with civil agencies, such as the Land Transport Authority and Traffic Police; and to foster greater understanding of the RSAF with residents living around Tengah AB. In November’s drill, twelve RSAF fighters and one E-2C Hawkeye Airborne Early Warning aircraft performed a total of twenty takeoffs, touch-and-go maneuvers, and landings on Lim Chu Kang Road within eighteen minutes. All RSAF fighter types took part in the exercise. Including the E-2C in the exercise was challenging, though, as its wingspan is about a foot wider than the six-lane motorway.

Lim Chu Kang Road, built in the early 1980s, is 7,800 feet long and nearly eighty feet wide. It runs nearly parallel with Tengah AB’s main north-south runway, which is 9,000 feet long and 150 feet wide. The road’s layout and infrastructure are tailored to allow the RSAF to convert it into an austere airstrip within twenty-four hours. The RSAF conducted its first emergency runway exercise from Lim Chu Kang Road in 1986. RSAF fighters also hit the road in 1990, 1992, and 1997.

About 200 personnel from Tengah AB take two days to convert the road into an airstrip, though the actual time needed is much less. They prune scores of trees lining the road; remove 1,200 meters of drainage tile; and unbolt more than 150 streetlights, forty road signs, seven traffic lights, and two bus stops. As the infrastructure is being dismantled, RSAF pilot Temp AB’s narrow runway to simulate takeoff and recovery operations on the road. The air force also rolls in a mobile air traffic control post, mobile arresting gear trailers, and approach lights.

The road is marked with large numbers at 1,000-foot intervals, beginning with seven at the takeoff point at the southern end of the road and ending with one close to the northermost tip of the road. Any pilot not lifting off after passing the one marker knows he is in trouble, as the six-lane highway suddenly narrows to a two-lane affair with trees growing on the center divider.

If the end-of-runway obstacles do not present enough of a challenge, the deep drain and tall elephant grass flanking the east side of the road do. A cemetery and chicken farm border the west side. Such conditions call for nimble fighters with good lateral control, with short takeoff and landing runs, and arresting hooks for catching the cable on the mobile arresting gear during emergency landings. RSAF F-16/Cs and single-seat F-5S Tigers have such features. The A-4JS Super Skyhawks and E-2C, designed to launch and recover from carrier decks, are also well-suited for the makeshift airstrip.

Air operations in Singapore are conducted in weather that many foreign pilots consider uncomfortably humid. Surface temperatures range from mid to high twenty degrees Celsius and humidity can range from sixty to 100 percent. Ground winds are usually light but weather conditions are unpredictable. A strong, hot, dry wind called the twice-yearly monsoon, Singapore is beset by a low cloud base with strong wind gusts, heavy rainfall, and thunderstorms. Visibility in some of these conditions can be poor.

While RSAF F-16s don’t have drag chutes, landing the compact fighters is a pretty smooth affair. Pilots would keep nose high and the airbrakes open during the landing roll to bleed off ground speed. The eighteen-minute emergency runway exercise capped some six months of RSAF planning, surveys, and community relations work to minimize inconvenience to the public. The RSAF’s ability to turn public roads into aircraft runways makes the air force one of the few in the world that regularly trains its pilots to use improvised airstrips.

David Boey is an aviation photographer based in Singapore.
and to function with targeting pods. The 80th flew with a targeting pod for the first time in January 2002. Pilots from the unit dropped their first laser-guided bombs (two GBU-10s) with targeting pods two months later. The entire squadron was targeting-pod qualified in August.

Until late fall 2001, the F-16 pilots from the 80th FS flew what is called mixed-block tactics with pilots from their sister squadron at Kunsan. Block 40 F-16 pilots from the 35th FS would refuel their targeting pods to direct laser-guided bombs released from the Block 30 F-16s from the 80th FS. "While mixed-block tactics allowed our wing to put more precision weapons on target, the approach usually required extended loitering times and re-attacks," notes Capt. Alex Gryskiewicz, the weapons officer for the 80th FS. "Mixed-block tactics also require greater coordination between the two squadrons and more complex inflight communications. All of these factors lower hit rates."

While an avionics software upgrade called System Capability Upgrade 3, or SCU 3, gave Block 30 F-16s the ability to carry precision-guided munitions, SCU 4 improved PGM capability by adding a combined global positioning and inertial navigation system. SCU 4 also allowed the jets to carry targeting pods. At about the same time SCU 4 was being installed in the Block 30 F-16s, a software upgrade for Block 40 F-16s called Tape 40T allowed the 35th FS the ability to drop inertially aided munitions. "The Wolfpack has only eighteen targeting pods, and all of these were assigned to the Block 40 F-16s of the 35th FS," notes Gryskiewicz. "Tape 40T allowed the Wolfpack to drop inertially aided munitions, lowering the reliability of the 35th FS’s new AN/TVS-2 inertial navigational systems and freeing some of the pods for our Block 30s."

Once the 80th FS pilots began flying with their own targeting pods, they had to learn to fly the tactics. "The break in the tactics called mixed-element tactics, had to account for limited number of pods and limited number of qualified pilots the unit may have at a particular time," says the group’s 2nd pilot. "If two aircraft fly with at least one pod, usually with the flight lead. The pair uses buddy-lasing attack tactics similar to mixed-block tactics.

"One big advantage of mixed element tactics, however, is that the pilots perform these tactics from within the same element instead of between two elements," Gryskiewicz explains. "The situational awareness datalink made available with SCU 4 allows us to use a cooperative weapon engagement function that improves our hit rates. Cooperative mode lets me tag my wingman. In air-to-ground mode, my display then shows the munitions my wingman is still carrying and the laser code he’s using. It also shows his time to impact and time to release. It tells me when to start lasing the target. The system works almost as if my targeting pod is on the other jet, or as if his bombs are coming off my jet. The automation significantly reduces the amount of radio communication to get bombs on target. The datalink also increases my situational awareness, giving me the fuel state of the tagged airplane, the status of his air-to-air missiles, his call sign, altitude, and relative position to my aircraft."

But even mixed element tactics are considered an interim solution. The ultimate goal is to have every pilot qualified to operate a targeting pod and every aircraft equipped to carry a targeting pod. To reach that goal, the 80th FS invited two instructor pilots from Luke to Kunsan last summer to augment its own instructor pilot core. The unit upgraded all of its pilots in three weeks of concentrated training. "In our most recent combat effectiveness readiness exercise," Gryskiewicz says, "we operated as a full-up targeting pod squadron. We still have limited targeting pod availablity, but the hit rates exceeded our expectations. We saw a twenty percent increase in lethality over mixed-block tactics. For example, if we hit seven out of ten targets in MBT, we’re now hitting nine out of ten targets. The improvements in weapon accuracy we take with the fight the night. PACAF has three F-16 squadrons in Korea. All three are now capable of dropping precision-guided munitions. We made these improvements a little at a time to the government.

"The ITO, the integrated tasking order, or our war plan, has changed three times since I got here eleven months ago," adds FYfe. "It incorporated the mixed block tactics when I arrived. With these tactics, we could cover more target sets with fewer aircraft because of the precision weapons. The ITO changed again when we got our own targeting pods. Then it changed a third time when the 35th FS began flying with JDAM. We cover a significantly larger target set than we could eighteen months ago because of the precision capability we’ve added to these aircraft.

A year from now when SCU 5 comes out for the Block 30 F-16s, we will be JDAM capable. That will give us a lot more options when weather is a factor as it often is in Korea."

Perception And Reality
Kunsan has a reputation as a base based near the border, or as a "hot spot." It is considered by some to be a haven for pilots who are not fond of the Korean peninsula and its atmosphere. The unit has a lot of work on its hands and its atmosphere is very much a "hamburger" atmosphere. "We’ve got a lot of wild stories about Kunsan," says 1st Lt. Tom Greenhill, an avionics technician with the 80th FS. "They said this place was out in the woods with absolutely nothing to do. They said it was a bad place to be. Kunsan is a remote location, but the isolation draws people to the community. This place, like any other tour, is what you make out of it."

"People tend to forget the hardships of being at Kunsan," adds Ellis. "They forget about the separation from family and the harsh weather. They remember the good stuff: the excellent flying, the closeness of the squadrons, and the intensity of the mission. They look back on Kunsan as a positive experience. People learn a lot about the airplane, the job, and about themselves for the few months they stay here. When I talk to my wife and children on the phone, I tell them I can’t wait to come home. At the same time, leaving will be tough. I made a lot of close friendships over here. I’ll miss this place."

Eric Hels is the editor of Code One.

Since we don’t have many distractions around Kunsan, we get real good at our job.

Headhunter And Juvat History
The 80th FS flew P-39 Airacobras from the jungles of New Guinea during World War II. After many missions, some the toughest of the Pacific Theater, dawn pilots from the 80th were often returning safely to Allied lines by sympathetic members of the local headhunting tribe. "The Juvat is a ceremony to drive away the evil spirit and to emphasize the fighting spirit of the 8th, the squadron began calling itself Headhunters in 1942."

Members of the 80th began calling themselves Juvats about thirty years later when the 80th was assigned to Kunsan AB, Korea—the current location of Lts. Gen. Jay Robbins, a former member of the 80th and vice commander of Tactical Air Command at the time, saved the unit from deactivation in 1971. The 80th was soon restored with personnel from the 31st Tactical Fighter Squadron. As pilots tore off their old 31st patch on their flight suits to wear on the 80th’s Headhunter patch, a portion of the old patch was sewn on. As a result, the last word of the motto of the 31st was lost as the 80th made the remnant permanent and adopted the motto Aestesatus Fortuna Juvat (Latin for fortune favors the bold as it owes. Throughout the US Air Force, Juvat has become synonymous with Headhunter and has been applied to any member of the 80th FS.

A special Headhunter patch ceremony was held at Kunsan. All Juvats knew the Headhunter story. They also know that the 80th was the first American unit to employ jet fighters in combat (the Lockheed P-38 Lightning) and that it produced three ace during the Korean War. Among the twenty-four Headhunter pilots who became known during World War II was Maj. Richard Benot, America’s ace of aces, Long known for forty-eight victories during the war by his Lockheed P-38 Lightning.
and to function with targeting pods. The 80th flew with a targeting pod for the first time in January 2002. Pilots from the unit dropped their first laser-guided bombs (two GBU-10s) with targeting pods two months later. The entire squadron was targeting-pod qualified in August.

Until late fall 2001, the F-16 pilots from the 80th FS flew what is called mixed-block tactics with pilots from their sister squadron at Kunsan. Block 40 F-16 pilots from the 35th FS would refuel their targeting pods to direct laser-guided bombs released from the Block 30 F-16s from the 80th FS. "While mixed-block tactics allowed our wing to put more precision weapons on target, the approach usually required extended loitering times and re-attacks," notes Capt. Alex Grynkiewich, the weapons officer for the 80th FS. "Mixed-block tactics also require greater coordination between the two squadrons and more complex inflight communications. All of these factors lower hit rates."

While an avionics software upgrade called System Capability Upgrade 3, or SCU 3, gave Block 30-F-16s the ability to carry precision-guided munitions, SCU 4 improved PGM capability by adding a combined global positioning and inertial navigation system. SCU 4 also allowed the jets to carry targeting pods. At about the same time SCU 4 was being installed in the Block 30-F-16s, a software upgrade for Block 40 F-16s called Tape 40T6 gave the 35th FS the ability to drop inertially aided munitions. "The Wolfpack has only eighteen targeting pods, and all of these were assigned to the Block 40 F-16s of the 35th FS," notes Grynkiewich. "Tape 40T6 allowed the Wolfpack to drop inertially aided munitions, lowering the reference time for aiming and allowing the jets to free some of the pods for our Block 30s."

Once the 80th FS pilots began flying with their own targeting pods, they had to adapt to a new system of tactics. Called mixed-element tactics, had to account for limited number of pods and limited number of qualified pilots the unit may have at any given time. Each two-Justgle, two-jet ship flies with at least one pod, usually with the ship's flight. The pair uses buddy-lysing attack tactics similar to mixed-block tactics.

"One big advantage of mixed element tactics, however, is that the pilots perform these tactics from within the same element instead of between two elements," Grynkiewich explains. "The situational awareness datalink made available with SCU 4 allows us to use a cooperative attack模式 where the pilots can improve their hit rates. Cooperative mode lets me tag my wingman. In air-to-ground mode, my display then shows the munitions my wingman is still carrying and the laser code he's using. It also shows his time to impact and time to release. It tells me when to start lasing the target. The system works almost as if my targeting pod is on the other jet, or as if his bombs are coming off my jet. The automation significantly reduces the amount of radio communication to get bombs on target. The datalink also increases my situational awareness, giving me the fuel state of the targeted airplane, the status of his air-to-air missiles, his call-sign, altitude, and relative position to my aircraft."

But even mixed element tactics are considered an interim solution. The ultimate goal should be to have every pilot qualified to operate a targeting pod and every aircraft equipped to carry a targeting pod. To reach that goal, the 80th FS invited two instructor pilots from Luke to Kunsan last summer to augment its own instructor pilot core. The unit upgraded all of its pilots in three weeks of concentrated training. "In our most recent combat effectiveness readiness exercise," Grynkiewich says, "we operated as a full-up targeting pod squadron. We still have limited targeting pod availability, but the hit rates exceeded our expectations. We saw a twenty percent increase in lethality over mixed-block tactics. For example, if we hit seven out of ten targets in MBT, we now hit nine out of ten targets. The improvement in lethality, we take the flight north. PACAF has three F-16 squadrons in Korea. All three are now capable of dropping precision-guided munitions. We made these improvements at little to no cost to the government." The ITO, the integrated tasking order, or our war plan, has changed three times since I got here eleven months ago," adds Fyfe. "It incorporated the mixed block tactics when I arrived. With those tactics, we could cover more target sets with fewer aircraft because of the precision weapons. The ITO changed again when we got our own targeting pods. Then it changed a third time when the 35th FS began flying with JDAM. We cover a significantly larger target set than we could eighteen months ago because of the precision capability we've added to these aircraft. A year from now when SCU 5 comes out for the Block 30-F-16s, we will be JDAM capable. That will give us a lot more options when weather is a factor as it often is in Korea."

Perception And Reality
Kunsan has a reputation as a base where heat, air conditioning, electricity, and running water are considered lux-
uries. The base also has a reputation among fighter pilots for some of the best flying in the world. Both notions are close to the mark.

"Newcomers tend to have negative comments about Kunsan because it is an isolated assignment," says Fyfe. "The base is significantly better than it was ten years ago when it had some significant infrastructure problems. My mental picture of the country was painted by old Korean War movies. I was pleasantly surprised when I got here in November 2001. The country is very pretty. The people are very friendly. Korean food takes some getting used to, but it's pretty good. The separation from your family is tough, but not as tough as it used to be. Those stationed here maintain familial contacts through emails and international phone calls. We have DSL Internet access here, so we can even use video cameras to see each other over the Web. The Air Force also grants thirty days of leave, which we usually take in the middle of our tours. "The time goes by quickly here," Fyfe continues. "Since we don't have many distractions around Kunsan, we get real good at our jobs. Young pilots get a lot out of Kunsan as a first assignment. They fly a lot and learn a lot. Many spend their spare time studying the threat. I've flown more in the last year than in any other year during my Air Force career."

"We do a lot of wild stories about Kunsan before coming over here," says Tsgt. Tom Greenhill, an avionics technician with the 80th. "They said this place was out in the woods with absolutely nothing to do. They said it was a bad place to be. Kunsan is a remote assignment alright, but the isolation draws people together. This tour, like any other tour, is what you make out of it."

"People tend to forget the hardships of being at Kunsan," adds Ellis. "They forget about the separation from family and the harsh weather. They remember the good stuff: the excellent flying, the closeness of the squadrons, and the intensity of the mission. They look back on Kunsan as a positive experience. People learn a lot about the airplane, about the job, and about themselves for the twelve months they spend here. When I talk to my wife and children on the phone, I tell them I can't wait to come home. At the same time, leaving will be tough. I made a lot of close friendships here. I'll miss this place."
About 200 personnel from Tengah AB take two days to convert the road into an airstrip, though the actual time needed is much less. They prune scours of trees lining the road; remove 1,200 meters of drain tile; and unbolts more than 150 streetlights, forty road signs, seven traffic lights, and two bus stops. As the infrastructure is being dismantled, RSAF pilots use Tengah AB’s narrow runway to simulate takeoff and recovery operations on the road. The air force also rolls in a mobile air traffic control post, mobile arresting gear trailers, and approach lights.

The road is marked with large numbers at 1,000-foot intervals, beginning with seven at the takeoff point at the southern end of the road and ending with one close to the northernmost tip of the road. Any pilot not lifting off after passing the one marker knows he is in trouble, as the six-lane highway suddenly narrows to a two-lane affair with trees growing on the center divider.

If the end-of-runway obstacles do not present enough of a challenge, the deep drain and tall elephant grass flanking the east side of the road do. A cemetery and chicken farm border the west side. Such conditions call for nimble fighters with good lateral control, with short takeoff and landing runs, and arresting hooks for catching the cable on the mobile arresting gear during emergency landings. RSAF F-16/C/Ds and single-seat F-5S Tigers have such features. The A-4J Super Skyhawk and E-2C, designed to launch from and recover to carrier decks, are also well-suited for the makeshift airstrip.

Air operations in Singapore are conducted in weather that many foreign pilots consider uncomfortably humid. Surface temperatures range from mid to high twenty degrees Celsius and humidity can range from sixty to one hundred percent. Ground winds are usually light but weather conditions are unpredictable from the twice-yearly monsoons. Singapore is beset by a low cloud base with strong wind gusts, heavy rainfalls, and thunderstorms. Visibility in some of these conditions can be poor.

While RSAF F-16s don’t have drag chutes, landing the compact fighters is a pretty smooth affair. Pilots keep the nose high and the airbrakes open during the landing roll to bleed off ground speed. The eighteen-minute emergency runway exercise capped some six months of RSAF planning, surveys, and community relations work to minimize inconvenience to the public. The RSAF’s ability to turn public roads into aircraft runways makes the air force one of the few in the world that regularly trains its pilots to use improvised airstrips.

David Boy is an aviation photographer based in Singapore.

Take The Fight North

Wolfpack war plans take the fight north in some of the oldest F-16s in the Air Force fleet. Block 30s built in the mid 1980s. The 80th FS at Kunsan and two F-16 squadrons at Cannon AFB, New Mexico, are the last active duty units in the Air Force to fly Block 30 F-16s. Kunsan’s Block 40 F-16s, flown by the 35th FS Pantons, were built more than ten years ago. However, age has little to do with capability these days when the Fighting Falcon is involved. Recent software updates to Block 40 F-16s allow the 35th FS to drop inertially aided munitions, such as the wind-corrected munitions dispenser and the joint direct attack munition. (The 35th FS dropped its first JDAM in September 2002.)

The Block 30 F-16s of the 80th FS have been transformed from dumb bomb droppers into precision attackers in the last year. “Our Block 30 F-16s were once considered a drawback for coming to the 80th FS,” explains Ellis. “We had some of the oldest F-16s in the active duty and they could not fly with a targeting pod. They also had an older avionics suite. All that has changed in the last year.”

The 80th still flies the same Block 30 F-16s, but recent software upgrades and the addition of GPS allow those airplanes to drop laser-guided bombs...
EVENTS

Poland Selects F-16

The government of Poland declared the advanced Block 52 F-16 aircraft as winning the fighter competition to supply the Polish Air Force with forty-eight multiorole aircraft. The purchase, announced in December, also includes advanced US weapons, US air force training, and long-term support. The F-16s are to be delivered between 2006 and 2008. Poland will become the ninth European country to fly the F-16, joining a NATO force of more than 1,000 other F-16s throughout the region. It will also become the twenty-fourth country to select the F-16—and the first former Soviet bloc country to buy US weapons. Polish Prime Minister Leszek Miller received an F-16 orientation in Warsaw at the conclusion of a ceremony recognizing the F-16 selection in early January.

Greece Gets First Advanced Block 52 F-16

The first of sixty advanced Block 52 F-16s ordered by Greece was accepted by the US government on schedule last October, thirty-one months after the letter of offer and acceptance was signed and only twenty-eight months after the contract was awarded. The Hellenic F-16, which involves substantial development effort, is being produced on a compressed schedule to meet customer requirements. The first aircraft will remain in Fort Worth until early 2003 to provide hands-on maintenance training, to check out new support equipment, and to validate technical manuals. Greece has ordered a total of 140 F-16s in three programs.

Second T-50 Flies

A second T-50 Golden Eagle completed its first flight last November in South Korea. The aircraft, the second full-scale development aircraft in the flight test program, had undergone ground checks since completing assembly last May. The first T-50 flew in August 2002 and reached its operational ceiling of 40,000 feet last November. En route to its operational ceiling, T-50 No. 1 climbed to an altitude of 35,000 feet where throttle transients were performed. At 40,000 feet, the aircraft accelerated to Mach 0.6 where it performed flutter and stability control tests.

night-vision-qualified pilots. We send majors and more experienced pilots to our operations support group where they can support wing-level planning.

Kunsan is often the first operational F-16 assignment for newly minted F-16 pilots. "We have about eleven lieutenants in each squadron right now," West explains. "That's a large number. Kunsan is both a good deal and a tough assignment at the same time for these pilots. The Air Force can't take pilots out of the cockpit until they are experienced, which is defined as 500 flying hours in a fighter. A pilot will accumulate more than 500 flying hours in a typical three-year first assignment. So they then will be eligible for a transitioning assignment. After a year at Kunsan, they are guaranteed another three-year assignment. New pilots willing to put up with the rigors of Kunsan can stay in a cockpit for four years."

Upon arriving, and after in-processing, new pilots get an introductory briefing from the wing commander (called the WOP). The briefing includes a history of the Korean peninsula and the Korean War. More recently, newcomers take a bus north for a tour of the DMZ. They get detailed briefings on war plans. Pilots new to the Block..."
Defend The Base

A tall hill called Big Coyote provides a complete view of the base from its southern tip. A twisty gravel road takes visitors to the top, which is fortified with machine gun nests and a howitzer. Patriot missile batteries are visible below. "If the North invades," explains Capt. Jason Hokaj, an F-16 pilot from the 86th FS, "we can cut down these trees to have a clear shot at enemy forces coming across those rice fields to the east."

Hokaj turns north and points to a razor-wired fence that runs along the coastline and marks the western perimeter of the base. "Rumor has it that North Koreans being trained for their special forces have to touch that fence to graduate," he notes. The story carries more weight than the typical urban legend: mini submarines from North Korea run aground and get entangled in fishing nets off the South Korean coast with a disturbing regularity.

"I don't doubt that the fence story is true," says Lt. Col. John Fyne, who commands the 80th FS. "The South Koreans are always uncovering special forces operations in the country. I'll read about an infiltration from the north in the press every couple of months. I haven't been here an entire year, but I have already seen two North-South altercations. When I first arrived, the South Koreans sank a North Korean boat that was in South Korean waters. A couple of months ago, the North Koreans sank a South Korean boat. The tension here is a lot higher than most places we can be stationed.

"Kunsan is like a deployed location near a front line," Fyne continues. "The demilitarized zone, the dividing line between North and South Korea, is only 100 miles north from Kunsan, about fifteen minutes in a jet. Base defense plays an important part of every exercise we take part in."

Accept Follow-On Forces

Few air bases have the experience Kunsan has in accepting new forces. Those stepping off the weekly Patriot are in-processed faster than newcomers.

Block 60 Engine Delivered

GE Aircraft Engines delivered the first F110-GE-132 engine to Lockheed Martin Aeronautics Company to power the F-16C/D Block 60 for the United Arab Emirates Air Force and Air Defense. The engine, which can produce up to 32,500 pounds of thrust, is the highest thrust fighter engine developed for the F-16. F110 engines power the majority of F-16Cs/Ds worldwide. Lockheed Martin is scheduled to begin flight testing the new engine in March 2003 at Edwards AFB, California. Flight testing the F-16 Block 60 powered by the new engine is scheduled for late 2003 in Fort Worth, Texas.

Have Lite Test Success

Lockheed Martin successfully conducted the first flight test of the Have Lite missile, demonstrating the ability of a USAF F-16 pilot to launch and control the weapon while also flying the aircraft. In the test, conducted at the Utah Test Range, the missile struck a stationary target, proving it could follow a planned mission route. In this test, the missile was launched from an F-16, flying Mach 0.7 at an altitude of 8,700 feet. After weapon release, the missile flew a straight path using GPS guidance to locate the target area. The aircraft then turned away from the target while maintaining data link with the missile. When in range, the F-16 pilot maneuvered the missile into the target using cockpit controls with the missile's terminal guidance TV seeker. As planned, the missile struck the target with an inert warhead. Have Lite is an advanced, air-to-ground, precision-guided missile designed for use on fighter aircraft. The missile, a smaller sized and reduced weight version of the AGM-142 Have Nap missile, provides the same lethal accuracy as the larger missile.

Conformal Testing Complete

F-16s configured with conformal fuel tanks, CFTs, completed twenty-one months of development flight testing last November at Eglin AFB, Florida. The tests, conducted by Lockheed Martin together with the 40th FTS at the Air Armament Center of Eglin, cleared the CFT for the F-16 flight envelope—nine g's, maximum angle of attack and sideslip, and maximum roll rate. They also demonstrated fuel system functional operation, air refueling and passed loads, flutter, stability and control, and vibration tests. CFTs are external fuel reservoirs attached on the upper surface of the F-16's fuselage, with the tank's lower surface conforming to the aircraft shape. They significantly increase the F-16's unrefueled mission radius. The first production CFTs are being delivered to the Hellenic Air Force.
F-16 CCIP Mod Completed
The first Phase IA Block 50/52 F-16 modified under the Common Configuration Implementation Program was delivered to the 57th FW at Nellis AFB, Nevada, in early December where it will undergo follow-on testing and evaluation. Phase IA incorporates the APX-113 air-to-air interrogator, two new color multifunction displays, and software for the high-speed anti-radiation missile targeting system pod. Phase II will be fielded in July 2003; Phase III, beginning in 2003, F-16s from the 389th FS at Mountain Home AFB, Idaho, are next in line to receive CCIP.

Belgian F-16 Pilot Goes To Space
Lt. Col. Frank De Winne, a former F-16 pilot with the Belgian Air Force, returned to Earth last November after an eleven-day stint on the International Space Station. He is the second Belgian, but most likely the first F-16 pilot, to have gone to space. De Winne flew into orbit with Russians Sergei Zaletin, Soyuz mission commander, and Yuri Lonchakov, Soyuz flight engineer, on the first-ever flight of the new Soyuz model TMA and returned in the old TM-34 Soyuz, which had been attached to the Space Station the last six months as an emergency return vehicle. While in space, De Winne (on left) performed several experiments with a newly installed glovebox container for conducting research in microgravity.

MIG-16s Over Afghanistan
F-16s from 312 Squadron at Volkel AB of the Royal Netherlands Air Force arrived at Manas AB in the former Soviet republic of Kyrgyzstan last October to patrol the skies over Afghanistan in Operation Enduring Freedom. They are part of the European Participating Air Forces deployment, which also includes the air forces of Denmark and Norway. All EPAF jets fly the close air support role enabled by the LANTIRN targeting pod and GBU-12 laser-guided bombs added with the Mid-Life Update. Manas is also known as Ganci AB, named after New York Fire Chief Peter J. Ganci, Jr, who died in the 11 September attacks. During the operation, EPAF F-16s were occasionally identified as MIG-16s by the Kyrgyz air traffic controllers.

Those assigned to Kunsan face twelve months at one of the last truly remote assignments in the US Air Force.
KUNSAN
F-16 OPERATIONS AT KUNSAN AIR BASE, KOREA

A nondescript airliner dubbed "the Patriot" lands at Kunsan Air Base, Korea, every Thursday to drop off about sixty fresh Air Force personnel at the Wolfpack—the 8th Fighter Wing. The aircraft, a charter, stays for an hour or so and takes off with an equivalent number of Kunsan veterans. Those arriving appear jetlagged from their fourteen-hour flight to Korea via Seattle, Washington. Those leaving say heartfelt goodbyes to friends. Officers at the base line up to welcome the newcomers and to thank those departing for their service. Newly arrived personnel destined for the 80th Fighter Squadron, one of two F-16 squadrons at the base, collect on one side of the ramp. An informal serenade ensues.

BY ERIC HEHS

Beside a Korean Wasserfall one bright and sunny day,
Beside a shattered Sabre jet a young pursuer lay.
His parachute hung from a nearby tree,
he was not yet quite dead,
So listen to the very last words the young pursuer said:
"I'm going to a better land where everything is bright,
Where whisky flows from telephone poles, play poker every night.
We haven't got a thing to do but sit around and sing.
And all of our crew are women. Oh death, where is thy sting?"
"Beside a Korean Wasserfall" and many other songs of varying degrees of decorum will be drilled into the memory of the newcomers in the days and weeks to come as they gather together for beers in their squadron hooch on Friday nights. (Hooches are small housing units converted into lounges or party shacks.) Those assigned to Kunsan face twelve months at one of the last truly remote assignments in the US Air Force. The small base, on the southwest coast of Korea, has no space for families. Whereas Osan Air Base, a much larger base about 200 miles northeast and very close to Seoul, gives officers the option of bringing their families, all US military personnel live at Kunsan without spouses or children. Their squadrons, therefore, become extended families. Without the demands of family, pilots, maintainers, and other personnel have little to distract them from the mission. Col. Scott West, the operations group commander of the 8th FW, sums up that mission: "Defend the base, accept follow-on forces, and take the fight north. Those eleven words make it simple for everyone on base to understand why they are here."

PHOTOS BY KATSUYUKI TOKUNAGA

Hill Pilots Set Four-Ship Record
Four US Air Force Reserve pilots from the 419th FW at Hill AFB, Utah, collectively set a new world record 7 December—they logged the most flying hours for a four-ship of F-16s during a combat training mission. Lt. Col. Mike Brutt posted 5,008 hours, Col. Ben Bartlett posted 3,122 hours, Lt. Col. Gary Batshich posted 2,877 hours, and Maj. Bill Lyons posted 3,024 hours for a combined total of 14,031 hours. The record was previously held by four pilots from the 162nd FW of the Tucson, Arizona, ANG who logged 13,041 hours flying together. The record for the most flying hours experienced by active duty pilots belongs to four pilots of the 62nd FS, 56th FW, Luke AFB, Arizona, who combined 12,699 hours together in a training mission last June.

F-16s Cover NATO Summit
F-16s and maintenance personnel from the 31st FW at Aviano AB, Italy, and the 52nd FW at Spangdahlem AB, Germany, deployed to the Czech Republic last November to assist in air defense over Prague during the 2002 NATO summit—an example of the interoperability and security cooperation existing between NATO allies.

Montana Wing Heads Home
Capt. Jason Green, an F-16 pilot from the 120th FW of the Montana ANG in Great Falls, puts on his helmet before flying a mission supporting Operation Southern Watch last fall. The wing left Prince Sultan AB, Saudi Arabia, the last week of October after being deployed as part of the 188th EFS. It is being replaced by the 188th FW of the Arkansas ANG in Fort Smith.

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Hill Pilot First To Log 5,000
Lt. Col. Michael Brill of the 419th FW at Hill AFB, Utah, became the first pilot in the world last November to log 5,000 flying hours in the F-16. His flying hours equate to 1,750,000 miles—enough to circle the Earth seventy times. Brill, a full-time Reservist, scored the milestone while training for high-altitude delivery of laser-guided bombs. Other hours were earned in three tours of Operation Northern Watch, two for Operation Southern Watch, and one for Operation Enduring Freedom. During those operations, Brill accumulated 122 combat flight hours. He currently serves as operations officer for the wing’s 666th FS. He was also the first pilot to amass more than 4,000 total flying hours in the F-16 in August 1998.

Double 4K At Tucson
Lt. Col. Robert McCutchen, commander of the 56th Operations Group Detachment 1 and senior Air Force aide to the 162nd FW, became the first active duty Air Force F-16 pilot to surpass the 4,000-hour mark last October in an hour-long sortie with Lt. Col. Nick Anderson of the 152nd FS in Tucson, Arizona, who became the first ANG pilot to achieve 4,000 hours in the F-16 last spring. The combined 8,000 flying hours between them establishes the most hours for a two-ship flight. The pilots are two of only three in the US military to fly more than 4,000 hours in the F-16.

Fresno’s High-Hour F-16
Two F-16s of the 144th FW of the Fresno, California, ANG surpassed 5,000 hours in flight last October to join the ranks of only three other F-16C Block 52 aircraft to reach that mark. The two F-16s make a total of five to surpass 5,000 hours in the ANG. The high flying time is attributed to Noble Eagle taskings, in addition to the wing’s previous NORAD commitments.

KAI is planning to hire two test pilots by mid 2003. “These pilots will most likely be ex: ROKAF pilots,” says Ha, who will be involved in the selection. “Experience and a good relationship with the ROKAF are important criteria for selecting a company test pilot. ROKAF rotates test pilots through this program. Cho, for example, leaves this year. He takes with him most of the flight test experience and the historical information associated with the flying. Dedicated KAI test pilots will provide continuity and corporate knowledge for the program. Eventually, the company test pilots will become the senior test pilots on the program and will convey their knowledge to ROKAF test pilots new to the program.”

More Than An Airplane
The ROKAF, like many air forces around the world, uses a wide variety of aircraft to train its fighter pilots. In Korea, students progress from the prop-driven Cessna T-41 Mescalero, to the supersonic jet-powered Cessna T-37 Tweet, and then to the supersonic Northrop T-38 Talon and the supersonic Hawk Mk 67. These are the F-16 before finally entering operational conversion training, which takes place at the operational units. Most of these training aircraft are very old. “The ROKAF plans to replace all of these aircraft with two trainers—the KT-1 and the T-50,” says Park. “The T-50 takes students from advanced jet training to actual operational type training missions in a single type of aircraft. Reducing the number of aircraft used in our training fleet makes obvious sense because it lowers logistics and support costs. However, the training system associated with the T-50 can decrease training costs even further.”

Lockheed Martin Aeronautics Company is analyzing the training requirements for different nations around the world to see how a T-50 syllabus can fit into their training programs and to see how much time and manpower a T-50-based training system can save. “You have to look at how much an air force spends to graduate a pilot from a flight academy and award him or her first wings,” says Park. “The T-50 addresses training costs systematically. A pilot can't make an smooth transition from a T-38 or a Hawk to an advanced fighter like the F-16. The T-50, with its modern cockpit and supersonic performance, is much closer to an advanced fighter like the F-16 or the Joint Strike Fighter. The T-50 familiarizes students with the weapons system and reduces the conversion time to the actual fighters. For a typical conversion course for the F-16, for example, our training system can save as much as thirty-five flight hours of flight time per student. The F-16 units can, in turn, use that extra thirty-five hours more effectively, say for tactical training.”

“T-50 should be viewed as a training system,” Park continues. “The system includes cockpit trainers, maintenance trainers, computer-based training, simulators, a training management system, and a ground training scoring system, to name just a few of the components. We even have training systems associated with the portable maintenance aid we use to identify and fix aircraft problems on the T-50.”

As more and more air forces look to commercial approaches for their training requirements, the T-50 stands out as one of the most viable and concrete alternatives. “Air forces around the world want a total package for training,” says Park. “They don’t want separate vendors. The F-16 is an airplane and they have to turn around and develop a training syllabus and training system themselves. They want a complete package. While the airplane is the most visible portion, customers will be just as impressed by the entire training system.”

The initial ROKAF procurement for the T-50 is approximately 100 aircraft, with a potential of another 200 to replace the ROKAF F-5s. KAI and Lockheed Martin project potential sales of as many as 600 aircraft worldwide. “We think the T-50 will become one of the world's premiere training systems,” concludes Park. “That was one of the objectives we had for the airplane when we designed it. The first flight last summer was just one step on the path to success.”

Erik Hebs is the editor of Code One.
Flight Testing

ROKAF and KAI formed a combined test force to plan, manage, and conduct the flight test program, which is scheduled to last through September 2005 when the production phase of the program begins. "KAI is using a US model to conduct flight tests," notes T.H. Ha, deputy chief of the T-50 Combined Test Force and the flight test director for KAI. "We based our flight test plan on the F-16 and then modified the plan to fit our needs."

The first T-50 aircraft will be used mostly to expand the envelope and to evaluate handling qualities. The second aircraft will be used for stability and control testing. The third aircraft, the first T-50 LIFT version, will be used to evaluate avionics systems. The fourth aircraft (another T-50 LIFT version) will be used to test the radar, various weapons, and other loadings. The flight test program first establishes an operational flight envelope. Afterwards, T-50 subsystems and capabilities, such as the radar and external weapons carriage, go through development and integration testing. Detailed test plans undergo extensive KAI and ROKAF review for technical and safety considerations. The results of the flight tests are analyzed by KAI and ROKAF and incorporated into the recommendations each party makes for the final certification of the T-50 for operational use.

"This flight test program was set up to start more slowly than it would have started in the United States," notes Tom Ryan, a Lockheed Martin senior technical manager in Korea. Flight testing a jet aircraft is something relatively new for Korean industry personnel, so they have a steep learning curve. "New relationships have to be established between KAI and ROKAF in a combined test force environment," he continues, "relationships between the military aviation and the aerospace industry are already in place in the United States. The T-50 flight test program is being conducted on a base where the 3rd Air Wing carries out a training role. The ROKAF generates a lot of training sorties. Commercial air traffic has eight flights in and out of Sachon every day on top of that. So scheduling is an issue. Weather is a factor here as well."

Ryan is a member of a team of Lockheed Martin employees working on the T-50 program at Sachon. "We perform two specific functions for the program here," says Craig Lawrence, a flight test engineer on the program. "One is technology transfer. We're here to assist KAI engineers to plan and conduct the flight test program. Our other function is to help the program run efficiently. We're here to help them maintain the schedule."

The technical assistance from Lockheed Martin has been invaluable. "My relationship with Tom Ryan and with other engineers from Lockheed Martin has helped me to be successful," says Ha, who was in charge of KF-16 acceptance flight testing before transitioning to the T-50 program. "The team effort is paying off. "The airplane is showing good performance and flying as expected. The problems we've experienced are typical early development problems. And that's why we do flight testing. Not all design issues are visible with computer modeling and wind tunnel testing. We're finding problems and fixing them before we go into production."

As the flight test program progresses, the developmental test flights will incorporate more and more operational testing. "This testing, planned and managed by the ROKAF, will determine that the T-50 satisfies the operational requirements for a primary jet trainer and an advanced fighter lead-in trainer," explains Col. Hee-Woo Lee, the director for T-50 development at the ROKAF System Program Office at Sachon. "Aside from test flights, the ROKAF will also assess the suitability of the T-50 integrated logistics support capabilities. In other words, we're evaluating how the airplane will be maintained. These evaluations cover technical publications as well."

"We're testing an advanced jet trainer, the T-50, and an advanced fighter in AFB, South Carolina," explains Lawrence. The first T-50 flew for the first time on 20 August 2002. The second T-50 flew on 8 November. The two T-50 LIFT prototypes are scheduled to fly in late summer 2003. "The T-50 LIFT has a fire control radar and a 20mm internal gun," Lawrence continues. "We will conduct weapon separation tests on the T-50 LIFT. About sixty percent of the flight test program is geared toward the fighter lead-in role. We could finish the testing for the advanced trainer version in eighteen months. Adding a radar, gun, weapons, and all of the related avionics significantly increases the size, scope, and complexity of the flight test program."

Four test pilots are currently active on the T-50 Program with more to be added in 2003. All of them are recruited from the ROKAF. "Pilots volunteer for the assignment," explains Cho, who has been on the T-50 program since 1999. "Because of the T-50's importance to ROKAF and to South Korea, we are honored to be chosen to fly for the program."

F-16 Units Receive DoD Maintenance Awards

The 310th FS, one of two F-16 squadrons assigned to the 31st FW, Aviano AB, Italy, and the 354th FW, assigned to Eielson AFB, Alaska, were two of six units awarded the 2002 Secretary of Defense Maintenance Awards at the DoD Maintenance Symposium and Exhibition in Reno, Nevada. They were awarded for making the most significant weapons systems and equipment maintenance contributions over the past year within the DoD. They join fourteen other T-50 units recognized in the eighty-year history of the award.

NCO Captures Aircraft Generation Award

SMSGt. Eric Trueth of the 20th FW at Shaw AFB, South Carolina, was awarded the 2002 Gen. Lew Allen, Jr., Trophy for leading more than 245 airmen in maintaining the squadron's thirty F-16s to produce 5,329 sorties for more than 8,300 flying hours. As the sortie generation superintendent of the 78th FS, his leadership enabled the squadron to generate the large number of sorties from a limited number of airframes while sustaining a thirty-eight aircraft utilization rate for three months. Nineteen aircraft are the standard. The award, named in honor of the tenth chief of staff of the Air Force, recognizes outstanding job performance, job knowledge, proven leadership, and direct sortie involvement as well as other military qualities.
First Raptor Delivered To Nellis

Lockheed Martin delivered the first F/A-22, Raptor 12, to the US Air Force Air Warfare Center early January following the signing of formal acceptance by US government officials. The delivery also marks the first F/A-22 delivery to Air Combat Command. The aircraft is to be flown to the 422nd Test and Evaluation Squadron at Nellis AFB, Nevada, where it will initially be used to teach operational test pilots how to fly the aircraft safely and maintenance personnel how to repair it effectively. AWG-105 pilots will eventually use Raptor 12 and the other seven F/A-22s assigned to the unit to develop the tactics, techniques, and procedures for the entire Combat Air Forces. They will also be used to train the initial cadre of Air Education and Training Command instructor pilots stationed at Tyndall AFB, Florida.

Raptor 11 Delivered

The last dedicated Initial Operational Test & Evaluation F/A-22, Raptor 11, was delivered to the US Air Force last November to complete the five-ship fleet of four operational jets plus a spare required by the Air Force for DIOTRE. The aircraft was flown to Lockheed Martin in Palmdale, California, to support DIOTRE pilot training scheduled to begin in February at the Air Force Flight Test Center at Edwards AFB.

First F/A-22 For Initial Operational Testing Delivered

The first F/A-22 Raptor purchased with production funds was delivered to the Air Force Flight Test Center at Edwards AFB, California, last October. The aircraft, Raptor 10, is a Production Representative Test Vehicle. It was flown to Lockheed Martin in Palmdale, California, to be readied to support F/A-22 Dedicated Initial Operational Test & Evaluation scheduled to begin this year. Once at Edwards, the aircraft will be assigned to the Air Force Operational Test & Evaluation Center, Detachment 6, serving alongside Raptors 08, 09, and 11 and demonstrating the Raptor is suitable for operational use.

The aircraft is designed to have the performance needed to support the lead-in fighter training missions. The LIFT version of the aircraft features a Lockheed Martin APG-67 multimode fire control radar, a modified General Dynamics M61 20mm internal gun, a weapons management system, and seven hardpoints for carrying a variety of air-to-air and air-to-ground weapons. (The standard T-50 does not carry radar or internal gun.)

Structural Testing

The T-50 structural ground test program, which began in January 2002, includes ground vibration tests, full-scale static test, and full-scale durability test as well as several other component tests. The ground vibration tests measure the dynamic frequency characteristics of the airframe structure and validate years of complex analysis. The full-scale static tests demonstrate that the structure can withstand the design loads with no detrimental deformation at limit load or rupture at ultimate load (1.5 times the limit load). The full-scale durability tests demonstrate the airframe structure will not fail from fatigue cracking for twice the predicted service life of the most severe predicted usage for the LIFT version, which is more than 8,300 equivalent flying hours. Durability testing for the second lifespan of the aircraft is scheduled to be completed in mid-2004. Vibration and static testing will be completed in fall 2003.

Fly-by-wire digital flight controls offer superior aerodynamic performance and handling qualities. Modern cockpit features include hands-on throttle and sidestick mechanismization, electronic flight instruments, head-up display, up-front controls, two five-by-five-inch color multifunction displays, integrated advanced avionics systems and sensors, GPS/INS navigation, in-flight recording and post-mission debriefing capability, and a Martin Baker zero-zero ejection seat. The seaboot angle is seventeen degrees, which is similar to the seat angles of the F-35 and the F/A-22.

"The T-50 is going to be a great trainer," says Cho, who flew a variety of fighters and trainers before becoming the chief test pilot for the T-50. "The aircraft was designed for low-speed approach landings. The larger tail, flaperons, and rudder make the aircraft easier to control at lower speeds. In addition, the control surfaces move at fast rates, which further improves handling characteristics. By design, the aircraft lands better than most fighters. The angle of approach is lower than that of an F-16, so the pilot has a better forward view on landing. The raised aft seat gives instructor pilots a much better view in front of the airplane as well. The flight control sidesticks in the front and rear seats move together, so instructor pilots can feel student pilot inputs."
Advanced computer-aided design and manufacturing was a key factor in the success of the program. "We took advantage of all of the computerized tools available," says Park. "We did not have to build a metal mockup for anything. This airplane was a 100 percent computerized mockup from the start. We also used concurrent engineering. For example, as the structural engineers designed the bulkheads, the manufacturing engineers designed the tools needed to manufacture the bulkheads. We made changes early in the design to improve how the airplane would be manufactured. The center fuselage began as a three-piece assembly, like the F-16. For manufacturing reasons, we changed it to a two-piece assembly. The change saved weight and simplified the manufacturing process. We could make this change because we worked with a digital design process to design the airplane and its manufacturing process at the same time."

A critical design review marked the completion of the detail design. The review verified that the design was mature and that the airplane's predicted performance would meet all of the requirements established by the BOKAF. Final assembly for the first full-scale development aircraft began in January 2001 when the forward, center, and aft fuselages along with the tails were mated together for the first time. KAI is building six FSD aircraft—four flying prototypes and two structural test vehicles. Structural testing began on the test vehicles in January 2002. The first (flying) T-50 rolled off the KAI production line in mid-September 2001. KAI conducted an official rollout ceremony at Sacheon six weeks later.

**Designed For Training**

From above, the T-50 looks much like a two-seat F-16. A bubble canopy, blended wing/fuselage, and the general planform shape are similar. With a length of forty-three feet and a wingspan of thirty feet, the T-50 is about four feet shorter than an F-16. The control surfaces and tails are larger relative to the T-50's smaller size. The extra area improves handling characteristics at lower speeds and makes the aircraft easier to land. Other distinguishing characteristics include a canopy bow that provides additional birdstrike protection; a narrower, more streamlined nose that corresponds to smaller radar requirements; and larger landing gears that absorb forces produced by higher sink rates (the vertical speed at which the airplane lands).

The most distinctive features of the T-50 are its twin side-mounted inlets that direct air to a single General Electric F404-GE-102 engine—the same basic engine used in the F-18 Hornet. The afterburning engine produces 17,700 pounds of thrust, giving the aircraft an excellent thrust-to-weight ratio. The maximum takeoff gross weight is 29,800 pounds and the maximum speed is Mach 1.5. The service ceiling is 48,500 feet. The design load factor is eight g's; the trainer airframe is designed for a 10,000-hour service life (8,300 hours for the lead-in fighter trainer version).

The T-50 has an onboard oxygen generating system, which simplifies maintenance tasks and reduces the amount of necessary ground equipment. A triple-redundant electrical system increases safety. Relaxed static stability and

**Supersonic AMRAAM Success**

The F/A-22 Raptor completed a key flight test goal last November by successfully launching a radar-guided AIM-120 AMRAAM to intercept an AQM-37 unmanned drone while both aircraft and target flew supersonic. During this first-of-a-kind test, Maj. James Dutton launched the unarmed missile from the Raptor at 35,000 feet above the Pacific Missile Test Range to the target approaching from the front at 50,000 feet. Post-flight analysis showed the AMRAAM passed within lethal range of the drone modified to emulate the radar cross section of a small conventional fighter aircraft. The AMRAAM was equipped with telemetry and GPS instrumentation to help determine missile accuracy.

**Expanding F/A-22 Envelope**

The F/A-22 met some of the last flight envelope expansion requirements last fall to begin pilot training for the upcoming Dedicated Initial Operational Test & Evaluation test program. The Air Force cleared the F/A-22 to fly at Mach 2 and above 50,000 feet and to perform such extreme maneuvers as a 9-g turn while flying subsonic at altitudes above 10,000 feet. Developmental flight testing continues at Edwards AFB, California, to further expand the flight envelope needed for DIOT&E.

**Raptor 08 Readied For DIOT&E**

F/A-22 08 has successfully completed the modification and upgrade at Lockheed Martin in Palmdale, California, to begin Dedicated Initial Operational Test & Evaluation in early October. Raptor 08 is the first of three F/A-22s scheduled to undergo DIOT&E readiness modifications at Palmdale. Based on lessons learned from the ongoing developmental flight test activities, Raptor 08 underwent a series of structural and electrical system modifications to support use on additional profiles as various speeds, altitudes, and angles of attack. Rapters 10 and 11 are being modified in Palmdale. Raptor 07 underwent DIOT&E modifications at Edwards AFB while Raptor 09 was upgraded at Lockheed Martin in Marietta, Georgia.

**Code One 27**
Supersonic Sidewinder Success

The F/A-22 successfully launched an unarmed AIM-9M against a QF-4 unmanned drone last November at White Sands Missile Range, New Mexico, to complete all four Pentagon-mandated flight test goals for 2002.

During the test, the F/A-22 test pilot James Brown flew Raptor 07 at supersonic speeds at 24,000 feet and fired on a drone flying at 14,000 feet several miles in front of the aircraft. The missile tracked the target and passed within lethal range to demonstrate Raptor’s short-range missile targeting and launch capabilities. A second AIM-9 live fire test is scheduled for 2003.

F/A-22 Facilities Program Begun

Lockheed Martin began a $113.6 million capital investment project late last year in Marietta, Georgia, to support F/A-22 rate production. The project consists of an 8,500-square-foot test facility to test the F/A-22’s fuel system for leaks before flight tests. Any repairs can then be performed inside the building. In early 2003, Lockheed Martin is expected to begin construction on a 30,000-square-foot flight operations facility to prepare the F/A-22 for flight tests, subsystem functional tests, and engine runs. The flight ops facility allows the aircraft to test in and out without having to be towed.

New Avionics Software Flown

The F/A-22 Raptor 06 flew the first time last November equipped with avionics software Block 3.1.1, an upgrade to increase the aircraft’s avionics capability and stability. These flight tests are an important milestone to support the timely start of Dedicated Initial Operational Test & Evaluation planned for this summer.

New F/A-22 Avionics Integration Lab Established

A new state-of-the-art avionics hardware and software installation and testing laboratory, called Raptor Avionics Integration Laboratory, was established at Lockheed Martin in Marietta, Georgia, last October to perform ground-based integrated avionics testing. RAIL will surround the F/A-22 hardware with sophisticated test monitoring equipment, integrate it with the latest avionics software, and then test it under simulated operational conditions. The laboratory incorporates lessons learned from the program’s ongoing developmental flight test program at Edwards AFB, California, which showed that more ground-based testing is needed to ensure adequate avionics stability.

The T-50 supersonic advanced jet trainer is the latest product of a relatively new, but highly successful, aviation industry in South Korea. That industry dates back to the late 1970s when Korean Air Lines began performing depot-level maintenance on USAF aircraft based in the Pacific. Daewoo, Hyundai, and Samsung established similar capabilities soon afterwards. KAI began assembling F-5Es for the ROKAF in the 1980s. Korean industry consistently received high marks for its workmanship and quality. It subsequently won contracts to produce a wide range of components and subassemblies for other aerospace companies, including Lockheed Martin. South Korea began developing its first aircraft, the Daewoo KT-1 Woong-Bee, in 1988. This turboprop trainer first flew in 1991, entered service with the ROKAF in 2006, and, as of late 2002, has accumulated more than 10,000 flying hours. In the meantime, Samsung became the prime contractor for the Korean Fighter Program, which involved the production of more than 100 F-16s for the ROKAF. The last of these F-16s are now rolling off the KAI assembly line at Sacheon.

While the T-50 is not the first aerospace project Korean industry has undertaken,” explains Park, “it is certainly the most challenging. Designing and developing a modern supersonic aircraft is an enormous task. It requires the efforts of hundreds of engineers and other technical personnel from companies around the world.” Those companies include General Electric, BAE Systems, Smiths Industries, Martin Baker, BF Goodrich, General Dynamics, Moog, Honeywell, Litton, Raytheon, and Rockwell.

Lockheed Martin, the primary subcontractor on the program, is responsible for the wing, digital flight control system, and the design of the avionics system. The company also provides substantial technical assistance to KAI.

Designing The T-50

The T-50 design balances the conflicting characteristics of performance, cost, reliability, and maintainability. The final shape of the aircraft is the product of the first phase of the program, the preliminary design phase. Engineers conducted configuration trade studies, wind tunnel testing, and design optimization in this initial stage. Predicted operational use sized the structure based upon the required service life of the airplane. Engineers then created specifications for major subsystems and components. Suppliers for these systems were selected based upon the best combination of cost and performance. Additional trade studies determined cost benefits for potential manufacturing methods and assembly sequences. A detail design phase followed preliminary design. In this second phase of the program, which began in the summer of 1999, engineers generated the drawings needed to build parts, tools, assemblies, and installations. “The challenges of this second phase of the program were staggering,” notes Park. “We had to produce detailed plans for more than 12,000 parts, assemblies, and installation—all in twenty months. Our KAI design teams successfully met the drawing release schedule. The number of drawing changes required because of interference or altered requirements was also very low compared with similar programs.”
After a few final checks, the General Electric F404 engine roars to full military power. The T-50 accelerates down the runway, lifts into the air, and joins two ROKAF F-16D chase aircraft. The T-50, with chase aircraft close by, climbs out of sight and to 7,000 feet for preliminary handling tests. Lt. Col. Gwang Je Cho, test pilot for the flight, takes the two-seat advanced jet trainer to 15,000 feet where he conducts more tests, including engine transients. The aircraft reaches a maximum speed of 245 knots and a maximum angle of attack of thirteen degrees. Thirty-nine minutes after taking off, the T-50 lands safely back at Sacheon.

Cho steps down from the cockpit, smiles, and signals thumbs up. He radiates the restraint of a test pilot: “This was a very enjoyable flight,” he says. “If future flights are as successful as this one, we should have a great advanced jet trainer.”

Concept To Reality
No Sun Park, the director and plant manager for the KAI Sacheon plant, exudes a little more enthusiasm as he reminds visitors of the significance of the first flight. “That flight marked the transition from concept to reality for the T-50,” he says. “We are now seeing the fruit of years of labor. We believe this airplane has a great future.”

Korea’s military establishment and government view the T-50 program as a critical step in modernizing their air force and nurturing an indigenous aerospace industry. The program originated in the early 1990s when South Korea’s Defense Development Agency and Samsung began studying designs for a fighter that could function both as an advanced jet trainer and a fighter lead-in trainer, or LIFT. The trainers would replace several aircraft in ROKAF inventory.

First Raptor Training Squadron
The 43rd FS was activated as the first F/A-22 training squadron in ceremonies last October at Tyndall AFB, Florida. Col. Mark Barrett, commander of the 325th FW Operations Group, officiated the ceremony in which Lt. Col. Jeffrey Harrigan assumed command. Earlier in the day, the new F/A-22 maintenance training facility was dedicated for the 372nd Training Squadron, Detachment 4, which will be responsible for F/A-22 maintenance training.

F/A-22 Program Leadership Changes
Brig. Gen. Richard Lewis and Brig. Gen. Thomas Owen were named to lead the F/A-22 program at Wright-Patterson AFB, Ohio, last October. Lewis, formerly director of the Joint Theater Air and Missile Defense Organization at the Pentagon, now serves as USAF program executive officer for fighter and bomber programs. Owen, formerly system program director for the C-17, now serves as system program director Ralph Heath was named executive vice president and general manager of the F/A-22 program at Lockheed Martin Aeronautics Company.

Dick Johnson Dies
Richard Leo Johnson, chief test pilot for General Dynamics Convair San Diego Division, died of cancer 9 November 2002 in Fort Worth, Texas. He was the first pilot to fly the precedent-setting variable-sweep-wing General Dynamics F-111, the Convair F-102 Delta Dagger, and the Convair F-106 Delta Dart. He was eighty-five.

Johnson’s extraordinary flying career, which encompassed thousands of flying hours in over 300 different aircraft types, spanned over a half-century. He was still a rated pilot at the time of his death.

Johnson was born in Cooperstown, North Dakota. An exceptionally talented baseball player, he was a top rated pitcher in the state’s amateur ranks and eventually played on a championship-winning American Legion team. Later, he earned considerable acclaim while pitching for Oregon State University. Following graduation, his skills were sufficient to merit an invitation from the Boston Red Sox farm system where he remained on the active roster until shortly after the United States entered combat in World War II.

Johnson enrolled in the US Army Air Corps in 1943. He became a fighter pilot and was assigned to the 57th Group’s 60th FS. Based in North Africa and Italy, he eventually completed 180 missions, primarily while flying Republic P-47 Thunderbolts. For his exceptional combat record, he was awarded the Silver Star, the Legion of Merit, four Distinguished Flying Crosses, and fourteen Air Medals.

Johnson became chief of flight test for fighter development at Wright Field near Dayton, Ohio, after the war. While assigned temporarily to Edwards AFB, California, he piloted the North American F-86 Sabrejet to a world speed record of 680 mph, an accomplishment for which Johnson received the prestigious Thompson Trophy. Four years later, assigned the task of demonstrating improvements in F-86 performances resulting from a new wing leading edge design, Johnson was sent to Korea. While introducing the aircraft to Korea, Johnson’s aircraft was destroyed on takeoff. Johnson died of cancer in 1982. Johnson was a member of the National Aviation Hall of Fame and was inducted into the Aerospace Hall of Fame. Johnson’s contributions to the flight test community were recognized with the presentation of the Aviation Week & Space Technology Achievement Award in 1976.
Letters

Higher, Faster, More Often

The Air National Guard units from Tulsa, Toledo, and Des Moines thank you for the great article on our re-engine program. The combination of Lockheed Martin and Pratt & Whitney has done it again. As a follow-up to your article, I would like to add some notes from our deployment to ONW during fall 2002. The 138th FW took the twelve jets with -229 engines from Toledo to Incirlik AB, Turkey, at the end of August. No spares were needed on the deployment. The airplanes flew flawlessly. The 138th replaced its personnel at the end of September and patrolled the Northern no-fly zone for the month of October. The 138th was the first Block 40/42 unit to dro (the GBU-31 JDAM and the first to do so in ONW on Iraqi air defense units targeting coalition aircraft in the no-fly zone. The new engines allowed unparalleled employment envelopes of this fantastic GPS weapon. In addition, the 138th used GBU-12s to destroy numerous antiaircraft artillery sites while maintaining standoff ranges.

Viper Paces

On behalf of all of the Spads of the 457th FS, my sincere thanks for the outstanding deed of Operation Enduring Freedom in last fall’s Code One. Once again, your staff has done a remarkable job of capturing the essence of not only our mission but also the demanding paces the Viper continues to be put through around the world.

The opening sentence of the article was spot on: “The success and speed of operations with the 301st FW to meet 100 percent of tasking throughout a very demanding rotation. Your article did a magnificent job of recognizing these dedicated professionals and their remarkable effectiveness.

Finally, the 457th FS was extremely honored by Price Randel’s painting on the cover. “No Sanctuary” set the tone for the entire edition. This work of art will enjoy a permanent and honored place in our squadron.

Lt. Col. Ken Bachelor
457th FS Commander
NAS Fort Worth JRB

Infinite Challenges

I’d like to send my thanks to the entire Code One staff for the exceptional coverage provided on the F-16’s role in Operation Enduring Freedom. The testimonials from members of the 491st FW and the host of other units illustrated the infinite challenges our service members faced in conducting operations in that area of responsibility.

Contingency operations are certainly not new to members of our unit, but even our most seasoned veterans were impressed with the work we were able to accomplish during the OEF missions. The list of achievements among the Air Force Reserve’s Block 30 F-16 community is long and illustrious. The pilots logged combat missions three times their normal length in a dynamic and ever-changing environment. Maintainers completed software capability upgrades to our aircraft in the middle of the deployment, upgrades that significantly enhanced our warfighting capability. A team manned to cover one contingency operation was able to cover two (Southern Watch and Enduring Freedom) simultaneously. These are just a few of the many notable highlights from our time in Southwest Asia.
The T-50 Golden Eagle fires its engine. Ground crew dressed in matching gray jump suits hustle around the airplane, preparing it for flight. They pull the chocks and make a few more checks. The engine revs and the airplane moves forward.

Engineers, support, and production personnel gathered at Korea Aerospace Industries (KAI) facilities in Sacheon, South Korea, applauded the orange, white, and gold aircraft thundering past. Heat waves generated by the August sun rippled off the pavement as the jet proceeded over a small bridge to the main runway at the Sacheon air base. The runway—normally shared by the 3rd Air Wing of the Republic of Korea Air Force, which trains fighter pilots in Sacheon, KAI, and several Korean commercial airliners—is devoid of air traffic. Today, other air traffic is put on hold as the T-50 prepares for its maiden flight.

I appreciate the recognition your fine publication provides to the men and women who serve. Our Citizen Airmen are an integral part of a great and enduring American tradition.

Col. Wayne County
Commander, 419th FW
Hill AFB, Utah

Beyond Invincible
Congratulations on a superb third quarter issue of Code One. "Enduring Freedom Debrief" was one of the finest series of articles I have ever read on air combat. I’ll keep this edition forever. Devoting an entire issue to pilot perspectives on this interesting chapter in American warfare was a great accomplishment. I was fascinated with the different viewpoints of so many units. The specific missions reported from both the ground and air perspective was especially moving. I remember flying over Afghanistan at 10,000 feet on night vision goggles, looking through my targeting pod, and feeling beyond invincible. I’ll never forget the brave Americans fighting on the ground. The forward air controllers on the ground were the real heroes of the air campaign. I was proud to be flying one of the finest warplanes in history, the Block 30 AFRC F-16 equipped with SADL, NVGs, and LITening pods. The American performance during Enduring Freedom showed it was a pretty miserable few months to be a terrorist.

Lt. Col. Lenney Dick
94th FW
Luke AFB, Arizona

Awesome Ground
I traveled to New York City with my daughter recently for her thirteenth birthday. While there, I visited Ground Zero. This is quite an awesome site to see. People still place fresh flowers along the fence. The stories and pictures are so moving that there is not a dry eye in the area.

I also took the opportunity to promote the role of the F-16 and the punishment it inflicted on terrorism. I wanted to let the 11 September survivors and heroes know that other heroes out there are inflicting justice on those who would terrorize our country. So I presented one of the first firehouses on the scene of the twin towers (one that lost several comrades), a police station, and the "Today Show" with a copy of Code One magazine and a poster of the cover of the magazine; a painting by Price Randel. Everyone was so impressed with the poster and very grateful for all our military is doing to fight terrorism.

As an Army brat and a seventeen-year spouse of a fighter pilot, I know firsthand the sacrifices our military members make every day. The painting on the cover of the magazine is of an F-16 attack on Afghanistan, which just happens to depict one of my husband’s missions (Lt. Col. Chris, page 25). I am so proud of him and all the other men and women who sacrifice so much to defend our country. Many people asked me to thank my husband for what he was doing and expressed their gratitude for all he continues to do. Others said that the military members were always in their prayers.

As I sit and write this letter tonight, our military is again preparing to go off and defend our country. I keep all of them in my prayers and their family members who make sacrifices to support them.

Lori
Fort Worth, Texas

The Big Picture
Thank you for highlighting the overall contributions of the US Air Force to Operation Enduring Freedom. As the commander of the 389th FS, I know a lot about the great contributions of Mountain Home’s Gunfighters. Because of Code One’s coverage, I now know not only how we integrated into the overall operations but also how superbly the total force operated during OEF. The superior actions of all of the units

Letters Expanded
My third quarter issue of Code One arrived somewhat late, but better late than never as they say. That is the reason I’m just now passing on my praise to you for your exceptional Enduring Freedom Debrief articles. They are truly insightful; accordingly, I’ve read the issue several times. With such great articles featured in every issue, I always look forward to reading the accolades posted in the letters section of the subsequent issues. With that said, the pending fourth quarter letter section, which you probably have to expand, should be a real good read.
One other note, those unidentified coalition forces depicted on pages 11, 17, and 19 are in fact members of Canada's 3rd Battalion, Princess Patricia's Canadian Light Infantry Battle Group, which included a reconnaissance squadron from Lord Strathcona's Horse (Royal Canadians) and combat service support elements from 1 Service Battalion. This Canadian contribution departed their home of CFB Edmonton for Kandahar on 1 February. After six months in theater, they have since returned home.

Great Lines
What a superb job on the Operation Enduring Freedom article in the third quarter issue. That was a great piece of writing. You allowed folks who couldn't be there to get a real feel for how things were there and for what a good job our guys did under very adverse circumstances. Great choice of format, using the continuous clips of the guys' own words. I especially liked the comments of Maj. Dino at the bottom of page 29 (I laughed a bunch over that one) as well as Col. Dave's closing Area Brief on page 44. Just great lines. In addition, Col. Dave's comment on the F-16 being a real force multiplier because of the limiting factor of tanker availability was something that just hadn't occurred to me before. I guess the Vipers were the only single-engine assets in the theater. What a great machine.

And thanks for the Iron Hand plug. The book seems to be doing well. The authors and I have received numerous compliments. A recent review in The Hook gave it raves.

Tony Casanova
Ontario, Canada

Cover Price
Great job on F-16 Operations in Afghanistan issue, starting with the awesome night cover by Price Randel. LM Aeronautics aviation artist. The Code One layout with interviews, acronyms, and first names of pilots and maintenance guys hit the mark. Stirred lightly with a flavor of tankers, F-16s, and the like, even some sheep) made the taste buds want more. Several pilots made the point that quick learning coupled with overall Air Force and Army teamwork with situations where prior training came into play resulted in successful missions. Keep up the superb blending of photo viewpoints and spiffing journalism.

Jim Eckland
Fort Worth, Texas

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Good job on F-16 Operations in Afghanistan issue, starting with the awesome night cover by Price Randel. LM Aeronautics aviation artist. The Code One layout with interviews, acronyms, and first names of pilots and maintenance guys hit the mark. Stirred lightly with a flavor of tankers, F-16s, and the like, even some sheep) made the taste buds want more. Several pilots made the point that quick learning coupled with overall Air Force and Army teamwork with situations where prior training came into play resulted in successful missions. Keep up the superb blending of photo viewpoints and spiffing journalism.

Jim Eckland
Fort Worth, Texas

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Code One is accepting nominations for the 2002 Semper Viper Award. The award pays tribute to F-16 pilots demonstrating airmanship skills noteworthy of its namesake, the late Joe Bill Dryden. A selection panel from Lockheed Martin Aeronautics Company evaluates candidates who carry on Joe Bill's tradition of excellence in airmanship and system knowledge. Candidate applications should be sent to the Code One office before 5 April 2003. Applications should include complete information describing particular missions or outstanding aviation skills demonstrated by the nominee.

Guard Reserve F-16s Hit Red Flag

F-16s from the 158th FW of Vermont went to train with the 177th FW from New Jersey and the 147th FW from Texas in Red Flag 03-01 at Nellis AFB, Nevada. These three ANG wings, which typically deploy together in the same Air Expeditionary Force, experienced the realistic training environment provided at Nellis for two weeks last fall.

Dogfighting Brothers

Maj. Lane Beene, an F-16 pilot from the Air Force Reserve Command's 457th FS from NAS Fort Worth JRB in Texas, and younger brother, Lt. Gary Beene, an F-15 pilot in the 65th FS at Eglin AFB, Florida, participated in a dissimilar air combat training and chased each other in the skies over the Gulf of Mexico in a long-anticipated contest of air superiority. They took turns gun-tracking each other and engaging in dogfight tactics eight minutes of the twenty-minute standoff. Each claimed victory for a draw.

1,000 Hours In F-104

Congratulations to Capt. Salvatore "Chico" Ferrara of the 9th FW of the Italian Air Force for surpassing the 1,000-hour mark in an F-104 last October.

Iowa Goes Tankers

The 185th FW of the Iowa ANG said goodbye to its F-16 Block 30 aircraft last December and is transitioning to the KC-135E to become the 185th Air Refueling Wing.

Block 42 At ONW

Weapon loaders swarm beneath an F-16, arming the fighter's munitions before a sortie from Incirlik AB, Turkey, last October. The aircraft are deployed with 125th Expeditionary Fighter Squadron from the Tuttle, Oklahoma, ANG in support of Combined Task Force, Operation Northern Watch. ONW has been enforcing the no-fly zone over Northern Iraq since 1992.

NJANG F-35

Albert Clark captured (okay, he created it) this image of a New Jersey ANG F-35 banking over Atlantic City AFB home of the 177th FW.

Lightning Flies Again

The F-35 Lightning, delayed on a Greenland ice cap sixty years ago took to the skies last October in Middlesboro, Kentucky, piloted by Steve Hinton, the aerial coordinator for the movie Pearl Harbor. Hinton fired up both 1,275-horsepower engines, taxied, and lifted off into a cloudy, Kentucky sky. After circling the airfield for about twenty minutes to the delight of 20,000 cheering observers, Hinton rolled wings level from a tight smooth turn and touched down. The vintage aircraft, built by Lockheed in 1942 was recovered and restored by Kentucky entrepreneur J. Roy Shuffner, a 1956s Air Force pilot. It was on its way to the war in Europe when it crash-landed in Greenland 15 July 1942 during foul weather. When found in 1992 entombed in 268 feet of ice, it was named Glacier Girl.

Santa Trades Reindeer For Nighthawk

Santa visited more than 160 children and parents last Christmas at the annual holiday children's party hosted by the 410th FTS at Edwards AFB, California. Absent Rudolph and accompanying thrusters, Santa chose an equally night-capable aircraft—the F-117 Nighthawk. The 410th is part of the F-117 Combined Test Force.

See codeonemagazine.com for more information.