

CODE ONE®

LOCKHEED MARTIN TACTICAL AIRCRAFT SYSTEMS

July 1998 Volume 13 Number 3





Aviation photographer Katsuhiko Tokunaga covers Misawa AB F-16 operations in an upcoming issue of *Code One*.

ABOUT OUR COVERS

Front: F-16 Block 60 becomes a reality as the United Arab Emirates orders eighty. Illustration by Doug Moore.

Back: A pair of F-16 Block 20 aircraft cruise over Monument Valley in Arizona. Photo by Nick Alvarado.

Editorial note: As the deadline approached for this issue, we had to choose between quick or thorough for the second part of the F-22 design evolution series. Thorough won out, so look for Part II in the October issue.



CODE ONE®

JULY 1998 VOL. 13 NO. 3

2

21st FIGHTER SQUADRON GAMBLERS
Newest Luke Training Unit Makes The Grade

12

INTERVIEW: COL. JEFFREY RIEMER
F-16 SPO Director Speaks Out

18

ISRAEL AIR FORCE
Fifty Years Of Air Superiority

26

CANADIAN STARS
T-33s Still Flying North Of The Border

32

EVENTS

Editor *Eric Hehs*
Art Director/Designer *Don Steger*
Editorial Assistant *Mary Lou Vocale*
Illustrator/Artist *Price Randel*
Distribution Manager *Herf Graham*

Director, F-16 Customer Requirements *Tim Roels*
Director, Communications *Joe Stout*
President, Tactical Aircraft Systems *Dain Hancock*

PERSONAL SUBSCRIPTIONS

Send name, address, and \$12 for a one-year subscription (four issues) to *Code One* at the address at right. Foreign subscriptions are \$25 (US). Some back issues are available.

ADDRESS AND PHONE NUMBERS

Code One Magazine, Lockheed Martin TAS

PO Box 748/Mail Zone 1224

Fort Worth, Texas 76101

Phone: 817-777-5542

Fax: 817-763-4797

E-mail: eric.hehs@lmco.com

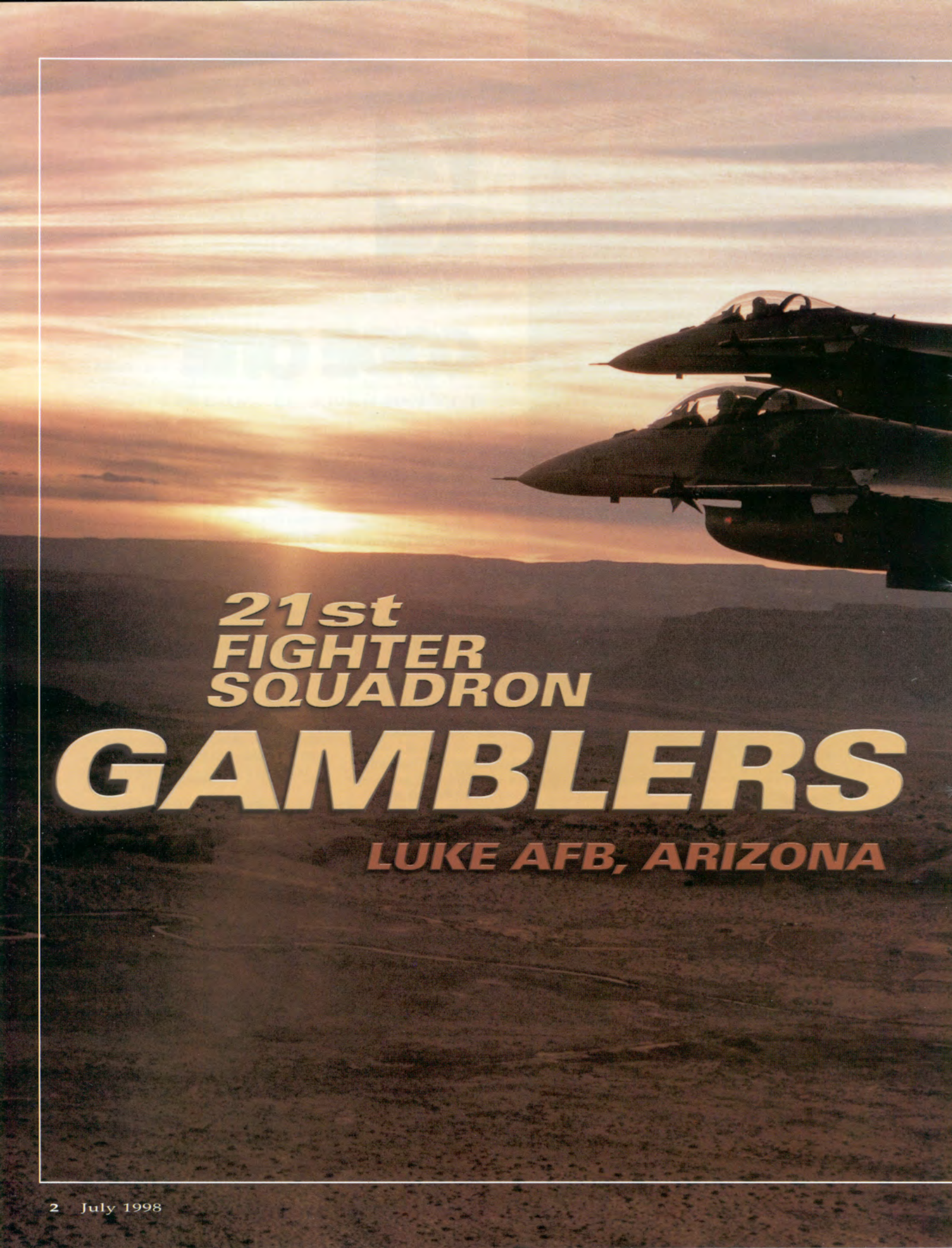
Web Site: www.lmtas.com/codeone/code1.html

Distribution info: 763-6655 (voice)/763-6656 (fax)

RESTRICTION NOTICE

This publication is intended for information only. Its contents neither replace nor revise any material in official manuals or publications. Copyright © 1998 Lockheed Martin Corporation. All rights reserved. Permission to reprint articles or photographs must be requested in writing from the editor. *Code One* is a registered trademark of Lockheed Martin Corporation. *Code One* is published quarterly by Lockheed Martin Tactical Aircraft Systems.

ISSN 1071-3816



**21st
FIGHTER
SQUADRON**

GAMBLERS

LUKE AFB, ARIZONA



The 21st Fighter Squadron consisted of little more than a few abandoned buildings at Arizona's Luke AFB in the fall of 1996. "We had no personnel and no airplanes," recalls Lt. Col. James Mitchell, the squadron's first commander. "We didn't even have our own squadron patch."

From these inauspicious beginnings, Mitchell and a half-dozen handpicked officers had to build a functioning F-16 training unit on short order. The buildings were renovated, furnished, and filled with personnel selected from other units at Luke and from other F-16 bases. A course syllabus was written as Block 20 F-16s off the production line in Fort Worth began populating the ramp. By January 1997, the Gamblers of the 21st FS were flying their first training sorties. Today, a year and a half later, the unit is recognized as one of the premiere training squadrons in USAF's Air Education and Training Command.



Lt. Col. James Mitchell



Luke AFB, on the western outskirts of Phoenix, provides a locus for USAF F-16 training. Eight flying squadrons of AETC's 56th Fighter Wing here are dedicated to F-16 training. Coursework spans the range from instructing pilots new to the F-16 to honing the skills of more experienced pilots in the latest systems incorporated into the Fighting Falcon. The 310th Fighter Squadron, for example, specializes in training pilots in LANTIRN and night vision goggle systems. The eight squadrons combined with the 944th Fighter Wing of the Air Force Reserve also make Luke the largest F-16 base in the world. More than 200 Fighting Falcons at the base fly about 180 sorties every day. Rarely does a minute go by when several F-16s are not tearing through the air overhead.

While most of the current pilot instruction at Luke involves USAF pilots, many foreign F-16 pilots are familiar with the nearby expansive training ranges in the Arizona desert as well. Most countries that fly the F-16 have sent their initial group of indigenous instructor pilots through Luke's F-16 training programs. And experienced foreign F-16 instructor pilots often visit Luke to master new systems being incorporated into the F-16 fleet to instruct fellow pilots at home.

Training international pilots at Luke, however, did not begin with the F-16. The first foreign students made their way to Arizona from China during World War II. These students were taught how to fly and fight in the P-40 Warhawk, P-47 Thunderbolt, and P-51 Mustang. Many of these pilots went back to China to fly in the 21st Fighter Squadron, one of the most successful Chinese squadrons to fight in the Pacific during the war.

USAF pilots at Luke have since trained pilots from many other countries, including Bahrain, Canada, England, Germany, Greece, Indonesia, Japan, Jordan, Kenya, Korea, Kuwait, Mexico, Morocco, Norway, Philippines, Saudi Arabia, Singapore, Spain, Turkey, Thailand, and Vietnam. Through the years, these student pilots have been trained at Luke in a variety of aircraft—the AT-6, P-40, P-38, P-51, F-84, F-86, F-100, F-104, A-7, F-4, F-5, and F-15. More recently, USAF instructor pilots have trained both aspiring and accomplished F-16 pilots from Bahrain, Egypt, Greece, Israel, the Netherlands, Indonesia, Korea, Pakistan, Singapore, Taiwan, Thailand, Turkey, and Venezuela.

Today, the 21st FS is the only USAF squadron at Luke dedicated to training international pilots new to the F-16. The unit has eighteen Block 20 F-16s, eight of which are two-seat B models. About 320 personnel comprise the 21st. The two dozen instructor pilots in the unit average



The most visible difference between a Block 20 aircraft and other earlier-model F-16s at Luke are the blade antennas on the nose of the aircraft and the extended housing at the root of the vertical tail.

about fifteen flights per month. Ninety percent of their sorties are related to instructing students. The remaining ten percent involves continuation training for themselves. The training program begins in the classroom. It then continues through a fifty-sortie syllabus that takes students from rudimentary lessons in flying the F-16 to basic fighter maneuvers in one-vs-one aerial engagements, through instruction in the more advanced systems used in coordinated air-to-air and air-to-ground missions against multiple targets and multiple adversaries.

The unique mission of the 21st FS as well as its new F-16s make it a prime assignment at Luke. "I have someone coming to my office two or three times a week looking for a position in the squadron," says Mitchell. "The unit has a strong reputation. And the Block 20 F-16 is a big draw. The aircraft's friend-or-foe interrogator, internal data modem, and color displays are impressive improvements."

Block 20 refers to new-production F-16s that incorporate significant avionic and structural enhancements. Many of these enhancements are supported by a modular mission computer that replaces three other computers and has faster processing and a large growth capacity. The aircraft's improved version of the APG-66 radar, called the APG-66(V3), has many new features, such as increased



The 21st FS credits much of its success to the close coordination between the unit and Lockheed Martin representatives, like Louie Heaton (far left).

detection and tracking ranges and the ability to track more targets simultaneously.

These F-16s also have an improved data modem, a ring laser inertial navigation system, a digital terrain system, an advanced interrogator for identifying friendly aircraft, wide-angle head-up display, color multifunction cockpit displays, up-front controls (a set of programmable push-buttons placed just below the head-up display), and Block 50-style sidestick and throttle controllers. Cockpit lighting is compatible with night-vision systems.

"The Block 20 has capabilities that other F-16s at Luke do not have," says Maj. Bill Lyons, an instructor pilot at the 21st. "Pilots especially like the aircraft interrogator, which allows them to distinguish friendly forces. The system simplifies aircraft rejoins, too. Moreover, the jet performs better because it is a little lighter than other F-16s I've flown and more maneuverable. In addition, it seems to have a little more thrust. At slower speeds, I can still move the nose around quite a bit."

"The computer that runs the radar gives a better presentation of information to the pilot," adds Maj. John Privette, another instructor pilot at the 21st FS. "The horizontal situation display is awesome. It really builds situational awareness. The datalink is good, too. We should have these systems on every jet in the Air Force. Here's my pitch for USAF: Put an HSD, datalink, and an interrogator in every F-16."

Privette's pitch is a common refrain at the 21st and at other F-16 units at Luke as USAF pilots come into contact with F-16 advances not yet fielded in USAF's own F-16

fleet. "Some of our instructor pilots shake their heads after they fly this airplane for the first time," Mitchell explains. "They wonder why USAF hasn't incorporated some of these capabilities. I have to remind them that we, too, will eventually get them."

Indeed, many of these capabilities will find their way into USAF F-16s within the next five years through several upgrade programs. European F-16s are receiving these improved capabilities already through the Mid-Life Update program. Furthermore, the current production configuration of the Block 50/52 F-16 aircraft, some of which are going to USAF, also have many of these advances.

The most visible difference between a Block 20 aircraft and other earlier-model F-16s at Luke are the blade antennas on the nose of the aircraft and the extended housing at the root of the vertical tail. The antennas are part of the interrogator system. The housing contains a parachute. Inside the cockpit, color multifunction displays are the most noticeable change.

"Color makes distinguishing information in the cockpit easier, especially on the horizontal situation display," says Lyons. "Pilots would get lost if everything appeared in the same color on the HSD. This aircraft can provide so much information to the pilots that we have to think in terms of what is most important. Sensory overload can be a problem with the students. Many are coming from the F-5, which is much less sophisticated. The Block 20 is loaded with avionics."

With its many new systems and capabilities, the Block 20 is essentially a new airplane packed into the effective form of an F-16. The first Block 20 rolled off the production line in Fort Worth in July 1996. The first two aircraft were fitted with flight instrumentation and headed to Edwards AFB for developmental testing. That testing is planned to continue through the end of the century to support planned software updates.

"Establishing a training wing with a new aircraft that had not completed operational testing presented one of many challenges to this program," explains Dick Steves, the Lockheed Martin program manager for the Block 20. "We managed to compress the typical schedule for fielding a new aircraft by working closely with the 21st Fighter Squadron. In effect, the first year of flying for the 21st was equivalent to an operational test and evaluation program. Through very close cooperation between the 21st, the F-16 program office in Dayton, and Lockheed Martin, we were able to learn much about system performance in the operational environment, information that is normally gained from a traditional operational test and evaluation program."



"In less than three months, we went from bare walls and no toolboxes or anything to flying airplanes," adds Lt. Col. Richard Grisct, the chief of maintenance at the 21st. "Getting a logistics tail in place and functioning properly usually takes a long time for any unit. But we did it in record time with what is essentially a new type of aircraft. The airframe is about the only feature shared with other F-16s. That is, the wings and tail are Block 50 and most of the fuselage is Block 15. The avionics suite, though, is completely different. Replacing an entire avionics suite makes this a new airplane."

Grisct is in charge of almost 200 maintenance personnel. Together, they have compiled an impressive track record: over 6,000 hours on eighteen aircraft and mission capable rates over eighty-eight percent, which exceeds the AETC standard of eighty-five percent. In the same period, the unit has cut abort rates and break rates in half.

"I look at maintenance statistics every day to see how we're doing," says Grisct. "I'm not comparing us with other units. I just want to make sure we are improving. Anyone here will say that the first measure of our success is graduating qualified F-16 pilots."

The 21st graduated its first class of students in July 1997. Its first class of instructor pilots graduated three months later. By the end of June 1998, thirty-four students had completed training at the 21st.

While graduating students is the primary measure of success at the 21st, the unit has also proved itself in direct competition with other USAF training units at Luke by winning the base's Frank Luke trophy. The annual award is based on combined scores from two separate competitions, called turkey shoots, held during the year. (The 21st also won the first turkey shoot for the 1998 Frank Luke trophy in April.) Each turkey shoot is broken into maintenance and flying events. The maintenance events consist of aircraft launches and recoveries and weapon loading. The flying events include air-to-air and air-to-ground components. The competition has been held at Luke every year since 1964.

The 1997 competition began in March, just two months after the 21st began flying operations. The Gamblers won the maintenance competition with a perfect score—a first for any unit at Luke. "We also won the first turkey shoot we ever competed in," says Mitchell.

"We had to fly four of our F-16s against eight F-18 Hornets in the March competition," says Privette, who flew on the winning team. "We do really well against F-18s. We were allowed full-up beyond-visual-range capability with our AIM-7 missiles. The F-18s had BVR capability as well. While they went into the fight with BVR tactics,



we relied on our non-BVR tactics to beat up on them. We didn't waste time trying to get long-range identifications on targets. Taking out one opponent with an AIM-7 before the merge makes the job much easier, but we relied more on the basics of what works best for a tiny airplane that maneuvers better than anything out there. We went and fought the way we learned it. Our strategy worked. We killed five of the eight F-18s. Two others had to jettison their bombs, so they would not have destroyed their intended targets. The last one turned and ran."

The maintenance and air-to-air wins, combined with an impressive third-place finish in the air-to-ground portion of the competition, gave the 21st

While graduating students is the primary measure of success at the 21st, the unit has also proved itself in direct competition with other USAF training units at Luke.



bragging rights for the first half of 1997. A second-place finish in the following competition the next December gave the unit the Luke trophy for 1997.

"The Block 20 obviously made a difference," says Mitchell. "It usually takes fifty to seventy-five hours for a newly produced airplane to settle in, for the gunsight and bombsights to stabilize. Our airplanes were at the thirty-to forty-hour mark in the first competition. So our early wins are that much more impressive."

Mitchell credits coordination and cooperation for the success of his unit. "The coordination between Luke, the F-16 SPO, and Lockheed Martin in Fort Worth has been incredible," he says. "We received our first aircraft at Luke in December 1996 and we were flying it within two weeks on instructor pilot upgrade training missions. We were flying student sorties within forty-five days. Doing so much in so little time with an airplane that has not been fielded before is incredible. We could not have succeeded without the coordination among the team members. I have, for example, an engineer who flies with me a couple of times a month from Lockheed Martin. He takes all of the write-ups and software anomalies when we land, gets on the phone, and has engineers working on the problems before I take off my g-suit."

"We get spoiled because we have such direct contact with the factory through Lockheed Martin representatives," says Privette. "A lot of things come up that the company needs to know right away to resolve. Most of them are software-related. The company has done a great job responding to our needs." Much of that responsiveness can be credited to Louie Heaton, the Lockheed Martin technical representative attached to the 21st. Heaton and others like him around the world function as the primary technical contacts between F-16 customers and Lockheed Martin whenever an F-16 is fielded or modified.

Heaton says many of the growing pains for Block 20 have been associated with the aircraft's modular mission computer. "So many systems rely in some way on the MMC, we were bound to have a few problems," he explains. "Fortunately, most of these can be addressed

with software changes. Now that the software has matured, though, MMC performance has greatly improved to the point of being almost trouble-free. Very few jets are returning with MMC problems."

The design of the MMC itself makes it easier to work problems. The system supports two-level maintenance because technicians work with modules (ruggedized circuit cards) that slide into the MMC instead of larger line replaceable units located at various places within the airframe. What formerly amounted to entire LRUs now fit on one of these modules. The MMC contains redundant modules, so technicians can troubleshoot by swapping modules within an MMC or between MMCs. The majority of the database of experience with the MMC is derived from the Block 20 experiences at the 21st FS. "The Block 20 flight test program at Edwards consisted of eighty sorties," explains Griset. "We've been flying eighty sorties every week since June 1997." Mid-Life Update F-16s, the only other F-16s with an MMC, have accumulated around 3,000 flying hours; the Block 20 has over 6,000 hours under its belt at Luke alone. The two flight test aircraft accumulated another 200-plus hours at Edwards AFB. These two aircraft, now in Fort Worth, will be used to test the next software update at Edwards this summer.

As the 21st produces new F-16 pilots at Luke, the Air Force will benefit from its experience with the MMC and with other advanced features found on these F-16s. From a meager beginning to a shining example in less than two years, the 21st Fighter Squadron continues to refine the state of the art for the F-16. □

Eric Hehs



PHOTOS NICK ALVARADO / LMTAS





Col. Jeffrey Riemer

F-16 SYSTEM PROGRAM OFFICE

Wright-Patterson AFB, Ohio

Col. Jeff Riemer is the director of the F-16 System Program Office at Wright-Patterson AFB, Ohio. Riemer is a graduate of the USAF Test Pilot School and served as an F-16 acceptance pilot and USAF Test Pilot School instructor. He was chief of performance and flying qualities and operations officer at the F-16 Combined Test Force at Edwards AFB, California, where he distinguished himself as project pilot on numerous hazardous development test missions. He also served as the Chief of F-16 USAF Programs Division at the F-16 SPO. His most recent assignment was program director of Special Programs at the Air-to-Air Joint System Program Office at Eglin AFB, Florida. Eric Hehs, editor of *Code One* Magazine, interviewed Riemer this spring.

What is the primary function of the F-16 SPO?

The SPO's primary function is to serve the warfighters flying the F-16. The SPO is the interface between the warfighter and the company that develops products for them. The SPO manages the development, production, modification, and sustainment of the F-16 worldwide fleet. We translate requirements defined by the warfighter into contracts that yield products. Our primary interfaces are with Lockheed Martin in Fort Worth, Air Combat Command, United States Air Forces in Europe, Pacific Air Forces, the Air National Guard, the Air Force Reserve, Air Force Materiel Command, the Pentagon, the Air Logistic Centers, and multiple international customers operating the F-16.

What style or philosophy characterizes your view of effective program management?

I am not a micro-manager. I provide people I work with responsibilities and expectations and point them in the right direction. I emphasize the importance of keeping our commitments to our customers, and I expect people on the contractor side and in other agencies we work with to keep their commitments to us. Our ability to commit to courses of action and to schedules is extremely important.

I have used a trust model for several years. The model is fairly straightforward. It emphasizes openness, being truthful, listening closely, and believing what we hear. Hidden agendas detract from getting to root issues. We need a willingness to admit to mistakes and address and correct them promptly so we can move on. Credibility and openness are big parts of the model. We have to depend on one another to do what we say we will do. We have to treat each other with fairness and respect. Both sides in the past have tended to make

fuzzy agreements with wide latitudes for interpretation. Fuzzy agreements lead to fuzzy results. So, we need to make sure that we understand up front what each party needs and wants and make agreements we can keep. If we can't keep an agreement, we need to give notice immediately and make sure that we reset the expectation quickly.

What unique experience do you bring to your position as the F-16 SPO director and how will the F-16 program benefit from this experience?

I have been involved with the F-16 since 1981 in different capacities. My early experience in Fort Worth doing acceptance testing gave me insight into issues the company has to deal with on the manufacturing line. I also participated on F-16 cockpit review teams, helping decide what went in the F-16 cockpit. So, I'm familiar with issues behind designing and manufacturing the airplane. I also established some good working relationships in those early days. Many people I worked with are now higher in the company. For example, Kevin Dwyer and I flew together on the flight line in 1981 and now we are working together at the senior management level.

During my assignment at the F-16 Combined Test Force at Edwards AFB, California, I was involved in the development of many of the systems now found in the F-16. As a test pilot, I participated in the development of the digital flight control system, automatic terrain following, engine testing, and stability and control testing. I have flown the first Full-Scale Development F-16s at the test force up to the latest Block 50 version of the airplane. So, I have experienced the growth and the breadth of the fleet first-hand. We are still flying Block 10 and Block 15 in the Guard. Having flown those airplanes, I can relate to those pilots as well as to the pilots flying the F-16s coming off the line today. Furthermore, my previous experience as Chief of USAF F-16 programs at the SPO helps me understand how our organizational structure and ways of doing things can be improved.

Experience in many facets of the program from many perspectives helps establish credibility with the warfighter community, with the company, and with people in the acquisition community. The warfighter community doesn't always trust the acquisition community. My background will help establish and build that trust.

What distinguishes the F-16 program office from other aircraft program offices?

The scope of the F-16 program is tremendous and unequalled by any other airplane out there. The F-16 is operated by twenty countries in about ninety locations. Not a minute goes by in a twenty-four-hour day that an F-16 is not flying somewhere in the world. We have to be ready to support those people flying the F-16 and be responsive to unpredictable real-world problems.



The scope of the F-16 is tremendous and unequalled by any other airplane out there.

Another distinction between this SPO and other SPOs is that the F-16 program is operating in all phases of the continuum, from design and development of new modifications through production. In addition, few other aircraft programs have a fleet as large as the F-16 to sustain. People at the F-16 SPO like the challenge. They can see how their jobs affect everyday activity in the field. In many development programs, people can't see the fruits of their efforts until well into the future.

The F-16 will continue to play a key role in meeting our warfighting capability for some time to come. Even though USAF F-16 production has diminished in recent years, we have approximately 1,500 USAF and over 2,000 international aircraft to support until follow-on aircraft take their place. As the fleet ages, many issues will require activity from all members of the team.

How well has Lockheed Martin been performing recently on F-16 programs?

Overall, you are doing great. We are producing fewer airplanes a month at a lower cost. That is an accomplishment that everyone can admire. I am pleased with many of the efforts and hopeful that we can make improvements.

What are the biggest challenges facing the F-16 program?

The biggest challenge is funding for modernization and for maintaining readiness in an environment of shrinking budgets. The situation forces us to focus our energies and prioritize our efforts to maintain readiness levels. Every dollar we spend on modernization is in hopes of making the airplane more effective, supportable, and reliable. Some of these investments do not have an immediate return. The current budget environment makes it hard to think in terms of spending money now to save money later. We have a strong case to make for such investments. Convincing people of the value of such investments is another challenge.

How do you plan to address this challenge?

We have to articulate with credibility the real-world impact of not making these investments. An \$80 million investment in radar today could save almost \$1 billion in sustainment costs for the Block 25 through Block 42 F-16s, for example. This investment sounds like a great idea and we would pursue it if we had the resources available. We have to champion things that are smart in a fiscally constrained environment.

We have to show what an improvement means for a crew chief out on the flightline or a pilot in the aircraft. The night vision system we are putting into F-16s at Aviano is a good example. In a previous issue of *Code One Magazine*, you described how difficult it is for pilots to deal with light sticks in the cockpit—taking the caps off the tubes, positioning them on Velcro fasteners, and doing all this in



flight when the light sticks burn out. The night vision imaging system eliminates that hassle, makes the airplane safer to fly, and makes it more combat effective. We have to use examples like this to help influence someone sitting in an office in the Pentagon, someone who has not been out in the field. We must get them to understand why an improvement is important. More simply, communicating these issues is very important.

We also need to be a bridge to the future. We know that the F-16 will not be flying forever. But while it is flying, we have to maintain its readiness. We have to bridge our current capability to make a smooth transition to the Joint Strike Fighter. Rather than compete with future follow-on aircraft, we should aid in the transition to those aircraft. We need to look for improvements in the F-16 that will decrease our life-cycle cost, and provide commonality with systems planned for follow-on aircraft. This would be a win-win for everyone.

How does the transition between the F-16 and future fighter programs look now?

We are looking at how the F-16 program can benefit future programs. I expect to do more of that in working with the JSF Program Office. We are looking at transitioning to a contractor-furnished equipment approach and a contractor logistics system for the JSF, for example. These commercial approaches have implications for the F-16 as well. So our interactions can benefit both programs.

What is the relationship between the F-16 SPO and those who oversee the Air National Guard and Air Force Reserve fleet of F-16s?

We have a good working relationship. With that said, the Guard and Reserve have often perceived the SPO as not moving fast enough to meet their needs. They have viewed our acquisition process as cumbersome and time consuming. We have taken many steps to improve this situation with acquisition reform. We are making some headway. We need to significantly shorten the time it takes to get improvements on contract.

If we are not responsive to our customers, they will find alternative ways to get what they need. The Guard and Reserve have done that in some instances. If I were in their shoes, I would probably have done the same. Alternative routes, however, have hidden consequences. They may get rapid implementation of a concept or capability, but they may not get the support tail that should go along with that capability—the technical orders, logistics trail, and long-term supportability. So they will insert a new capability into the airplane. It works great. But when it breaks, it is not supportable. Then the F-16 SPO often has to deal with the problem. The solution often goes back to that cumbersome process that led to their taking an alternative approach in the first place. We are winning some favor by trying to collapse our span times. We also have to show how certain processes serve a useful purpose.

The relationship with the Guard and Reserve is always evolving. They need to appreciate the value we have to offer. We need to work in everyone's best interest. Quick is not always best. Thorough within a reasonable timeline seems to offer the best solution for all parties.

How important is it for the Air Force to maintain orders for the F-16 to retain an industrial capacity for the United States?

The United States needs to maintain the capacity to produce premiere fighters. We need to decide where our long-range capability is going to be and invest the money accordingly. In the last few years, the Air Force has not requested new F-16 buys. However, Congress has added a few aircraft per year to maintain a production capability. Whether this trend will continue is difficult to predict.

What emphasis do you place on acquisition reform? Will commercial support—what has been called contractor lifetime support and total system

performance responsibility—be considered by Air Force Materiel Command for future contracts involving the F-16?

The controversial issue of depots and transferring work to contractors from the depots has not been decided. I can't predict how those decisions will go, but I think we will see more open-mindedness in making the decisions.

Ultimately, the decision has to be made according to what is in the best interest of the taxpayer and in terms of the cost of ownership of a weapon system over its entire life cycle.

AFMC needs to implement strategies that provide the best value to the government. If best value means using contractor capability because of limited dollars, we have to use that capability. We don't have the luxury to sustain programs or capability we don't need. I think we will see a greater willingness to support

new ways of doing business as budgets continue to shrink. Things like contractor lifetime support will get more attention now than they ever have in the past.

What improvements would you like to see in the contracting process for the F-16?

The current cycle time to get something under contract is unacceptable. I have just come from a program in which we could contract major efforts, from start to finish, anywhere from sixty to eighty days. Some portions of the process are approaching these faster cycle times. But when these portions are added together, we are nowhere near where we should be.

My major initiative this year will be to collapse that cycle time. Some of the processes established for the F-16 program years ago should be jettisoned or redesigned to reflect a new way of doing business.

We are going to have to rely on that trust model I mentioned earlier because changing the process will take a lot of trust. We have to get rid of unneeded efforts related to negotiations and the proposal process. My goal is to demonstrate on the international and US Air Force side at least two examples of start-to-finish contract awards in ninety days. Both sides of the team need to address this issue.

What are the most important improvements being made to USAF's F-16 fleet?

It is important to understand that the F-16 SPO is not in the position to determine what is important. We take requirements identified by the warfighter and translate them into capability on the ramp. What I view as important

The more development activity behind advanced F-16 versions, the lower the unit cost and the more attractive some of these possibilities become.

for the airplane may be quite different from what someone whose life is on the line every day over Bosnia views as important. We assist in identifying improvements and give our perspective. We provide useful information to help warfighters make good decisions.

Some improvements we're working on for the F-16 fleet include a new datalink capability called Link 16, a helmet-mounted cueing system, color cockpit displays, and the modular mission computer. We have combined these systems into an improvement upgrade package for the F-16 fleet. We are improving the F-16's operational flight program as well.

What scenarios might lead to a significantly advanced USAF version of the F-16, what some might call a Block 50-plus or Block 60?

USAF has demonstrated a commitment to the F-22 and to the JSF. With that as a prelude, you won't see USAF buying a significantly advanced version of the F-16. Part of my role as a SPO director is to provide a bridge to the current plan. However, I must also be prepared in case the current plan changes. In other words, USAF won't be left without a plan. If JSF is delayed for some reason, as an example, I think we have to start looking at F-16 upgrades that would benefit our capability and improve our sustainment and reliability.

How does the F-16 SPO support development programs that relate to foreign military sales?

We have initiatives that link the USAF side of our operations with our international side. We look for cooperative opportunities to make sure that international customers benefit from USAF developments and that we benefit from international developments. The modular mission computer is one example of a cooperative effort. The MMC is being used in the Mid-Life Update F-16s for our partners in Europe and in Block 20 F-16s being flown at Luke AFB. USAF will benefit from the development of the MMC when it begins retrofitting F-16s with the computer in the near future.

What is your view of the potential of offering refurbished F-16s to central European countries interested in joining NATO?

After demonstrating our ability to refurbish F-16s for the Royal Jordanian Air Force, more countries will probably express interest in this inexpensive method for improving the capability of their air forces and for becoming more compatible with NATO forces. We are looking at programs for refurbishing mothballed F-16s in the desert and upgrading these airplanes to an MLU configuration. Refurbished F-16s provide a cost-effective alternative to countries that may not be able to handle the expense of new fighter aircraft.



How important is having a US fighter for being a member of NATO?

I'd like to see all new members of NATO choose US fighters. In my mind, the fighter of choice should be the best one the United States can give them and that is the F-16. These countries will participate in coalition forces. Coalitions work better if they have equipment and aircraft that are compatible. If they purchase F-16s, we know they will be compatible with the majority of our fleet. USAF and these countries can benefit from the economy of scale provided by these F-16 sales and benefit from modifications and improvements that go along with refurbishing existing aircraft and manufacturing new ones.

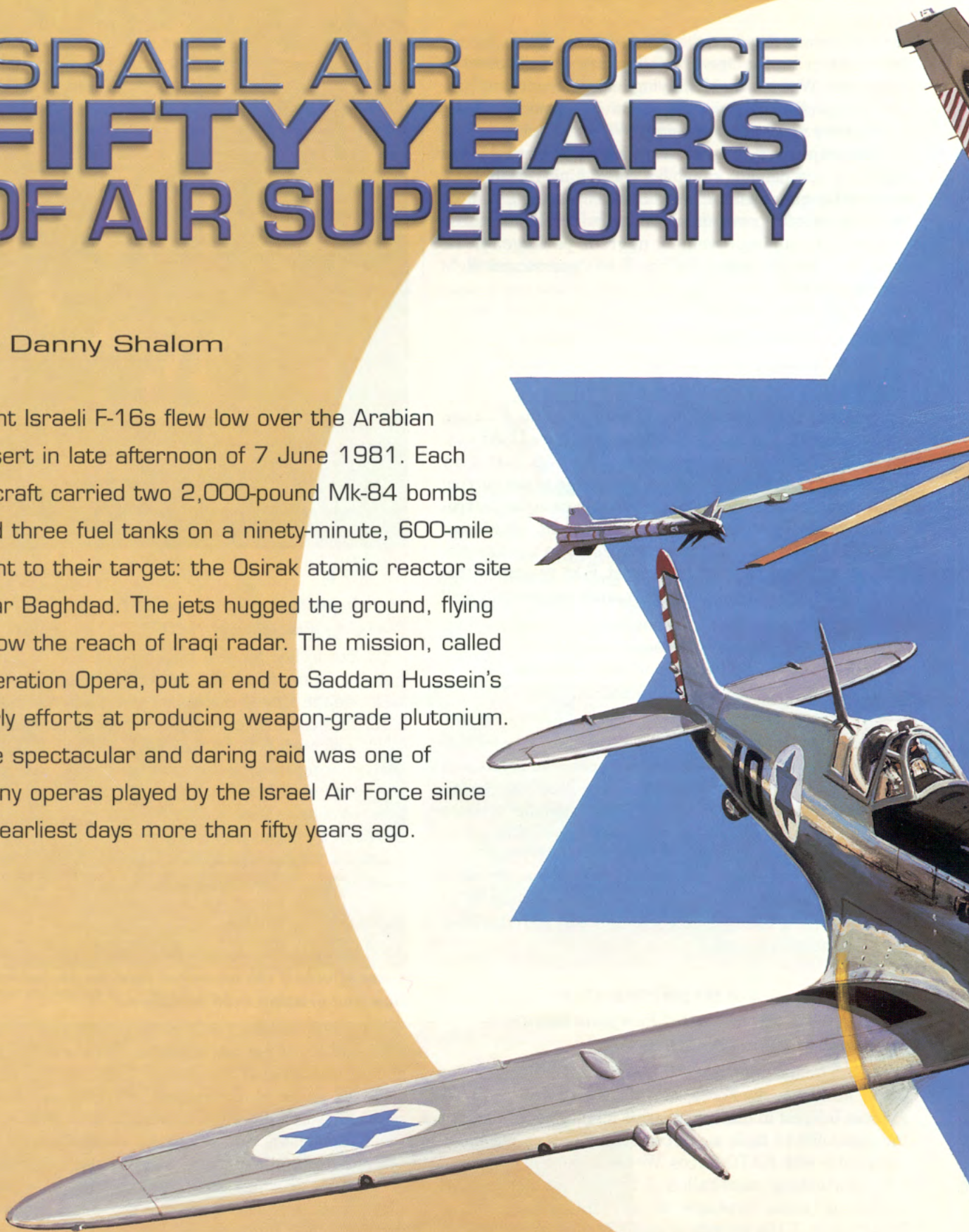
Several foreign air forces are considering advanced versions of the F-16. How will the F-16 SPO support these efforts if the advanced versions are selected by new and existing F-16 customers?

We will be involved only to the extent these customers seek and allow our participation. They will not want us adding additional requirements that may drive up their costs. If some of these improvements can lower our support costs, we need to determine what level of involvement can benefit USAF and the other F-16 customers. Countries committing to an advanced version of the F-16 provide an opportunity for the Air Force to benefit from these programs. The more development activity behind advanced F-16 versions, the lower the unit cost and the more attractive some of these possibilities become. All participants in these programs win. □

ISRAEL AIR FORCE FIFTY YEARS OF AIR SUPERIORITY

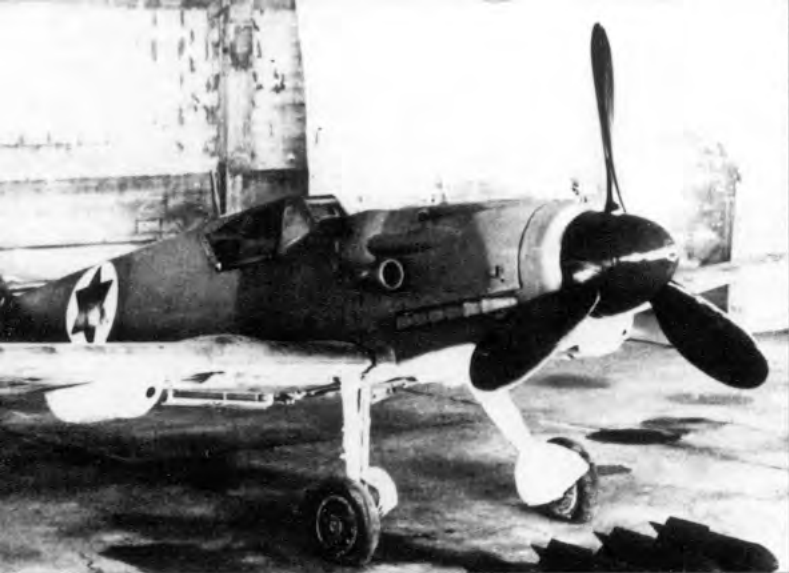
By Danny Shalom

Eight Israeli F-16s flew low over the Arabian desert in late afternoon of 7 June 1981. Each aircraft carried two 2,000-pound Mk-84 bombs and three fuel tanks on a ninety-minute, 600-mile flight to their target: the Osirak atomic reactor site near Baghdad. The jets hugged the ground, flying below the reach of Iraqi radar. The mission, called Operation Opera, put an end to Saddam Hussein's early efforts at producing weapon-grade plutonium. The spectacular and daring raid was one of many operas played by the Israel Air Force since its earliest days more than fifty years ago.





K. Price Randel



S 199, a Czech version of the Me 109, was Israel's first fighter.

Israeli air power traces its beginnings to November 1947, when the Haganah, a clandestine army formed before Israel declared its independence, collected all flyable aircraft to form the Sherut Avir, the Air Service. This early collection consisted of small and light airplanes, including the American Taylorcraft, British Auster, Polish RWD.8 and RWD.13, and twin-engined deHavilland Dragon Rapide.

Israel's declaration of independence on 15 May 1948 led to a regional war. The new country's embryonic air force was no match for its Arab foes. Fighter and transport aircraft from Egypt, Iraq, and Syria flew freely over the skies of Israel during the initial conflict. Furthermore, the fighting resulted in a US and British arms embargo on the whole of the Middle East. Israel, in turn, had to look for alternate sources of hardware for its defense.

Most aircraft were smuggled to the region from Europe during the war. These aircraft included Curtiss C-46 Commandos, Boeing B-17s, British Mosquitos, a Douglas DC-5, and some additional light planes. These aircraft were followed by twenty-five Avia S 199 fighters from Czechoslovakia.

The S 199, a Czech version of the Messerschmitt 109, was regarded by many as more dangerous to its pilot than to its adversaries. The aircraft was difficult to fly, underpowered, and poorly built. It frequently overturned during takeoffs and landings. Still, Israel's first fighters were pressed into immediate service in May 1948 to attack an armored column on the outskirts of Tel Aviv. A week later, an S 199 scored Israel's first air-to-air victories after shooting down two Egyptian C-47 Dakotas performing aerial raids on Tel Aviv. The Israel Air Force, renamed the Heyl Havar, had arrived.

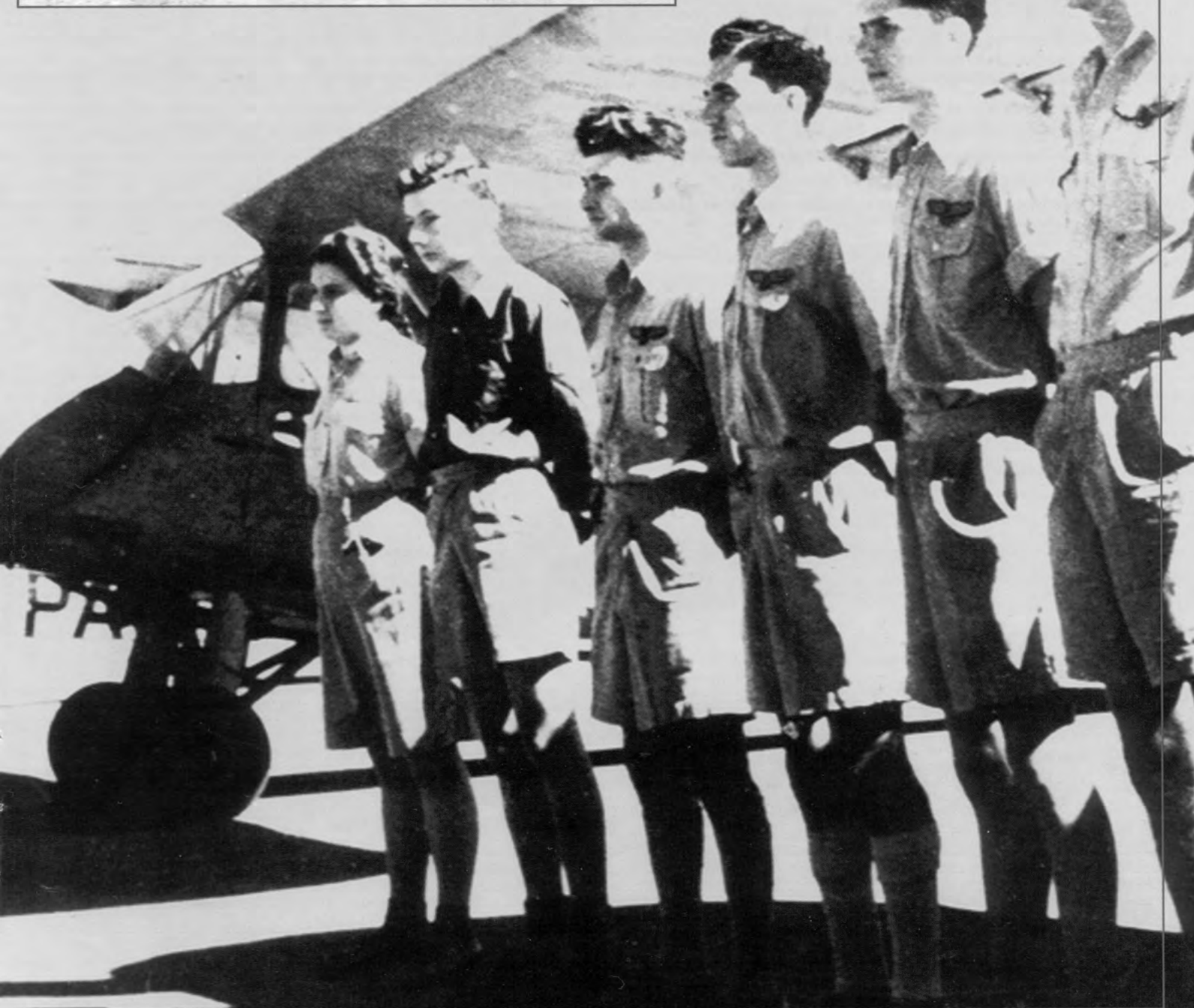
The IAF's S 199s were followed by fifty World War II vintage Supermarine Spitfires, also from Czechoslovakia. (These aircraft, flown by free Czech pilots with Britain's RAF during World War II, fell out of favor as the Soviets extended their influence over Eastern Europe after the war.) As the Spitfires arrived, the military balance in the Middle East shifted. Israel began to assume air superiority over its own land.



The IAF received P-51 Mustangs from Sweden in the early 1950s.



The Supermarine Spitfire helped Israel attain control over its skies in the country's earliest days.





The V-tailed Magisters were eventually built in Israel.

The War of Independence ended with a cease-fire in January 1949. During the early 1950s, British Spitfires and Mosquitos roamed Israeli skies. These airplanes were soon joined by North American P-51 Mustangs acquired from Sweden's air force. The jet era dawned in Israel with the arrival of two Gloster Meteors from Britain in June 1953. Two years later, the first of many French jet fighters and fighter bombers to join the Israel Air Force came in the form of seventy-five Dassault Ouragans and sixty Mysteres.

War erupted in the Middle East again in October 1956 with the Sinai Campaign. Hours before the campaign by British, French, and Israeli forces began, Israeli P-51 Mustangs flew low across the Sinai desert and sliced Egyptian telephone lines with their propeller blades. As the battle waged, Israeli jets faced Egyptian MiG-15s and MiG-17s. Israel used its piston aircraft and jets to strafe roads and bomb enemy positions. Piper Cubs transported officers and conducted reconnaissance missions. Transport aircraft supplied troops behind enemy lines. Only fifteen Israeli aircraft were lost in the brief but intense campaign.

Soon after the 1956 war, the Israeli Ouragans were joined by Dassault Super-Mystere B-2s, SNCASO Vautour bombers, and Fouga Magister jet trainers. The V-tailed Magisters later became the first military aircraft built in Israel. Israel received its first Mach 2-capable fighter, the Mirage III, in April 1962. In the first dogfight between two supersonic aircraft, an Israeli Mirage III downed a Syrian MiG-21 in July 1966 over the Golan Heights.

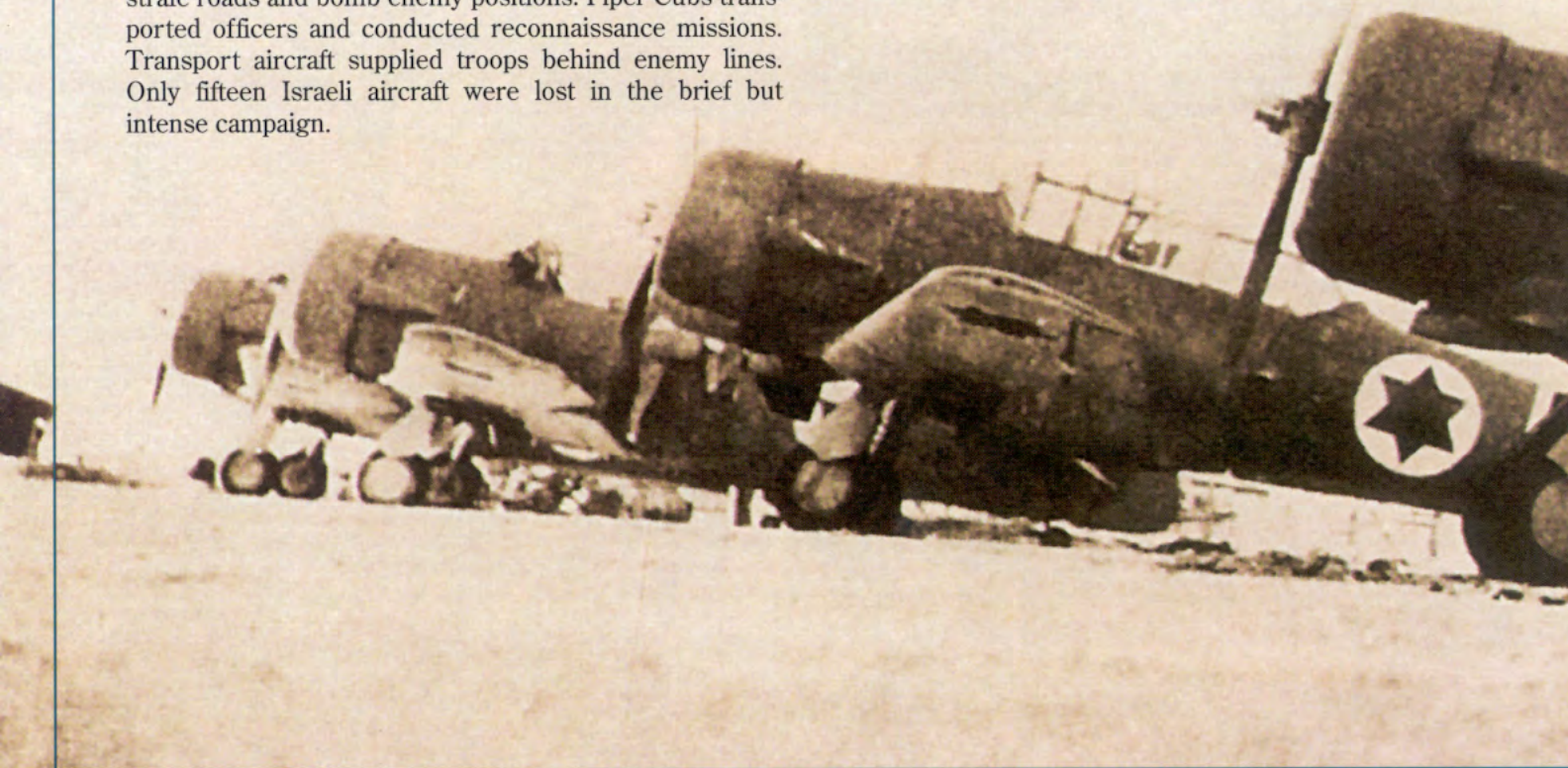
In August 1966, an Iraqi defector landed a MiG-21 at an Israeli air base, providing Israel and the West with the first look at this Russian front-line fighter. The tension between Israel and its northern neighbor Syria was very high.

Israeli pilots often encountered Syrian fighters in border disputes over the Golan Heights and the Sea of Galilee. One such encounter, on 7 April 1967, resulted in the downing of six MiG-21s by Israeli Mirage III fighters.

The aerial fighting was a prelude to the Six Days War. On the morning of 5 June 1967, all available IAF fighters



The Dassault Mystere flew with the IAF from 1954 to 1971.



and fighter-bombers flew low over the Mediterranean for a surprise attack on targets at front line Egyptian air force bases. Only twelve Mirages were left to defend Israeli airspace. After six hours of fierce and demanding air battles, the IAF commander Mordechai Hod informed his superiors that the Egyptian Air Force was neutralized. Iraqi, Jordanian, and the Syrian forces were engaged next by Israeli forces, which destroyed hundreds of fighters and bombers on the ground and in air battles. As a result of its surprise tactics, IAF fighters flew relatively unopposed in ground battles over the Sinai, the Golan Heights, and the West Bank.

France placed an arms embargo on Israel after the Six Days War. In turn, Israel looked to the United States for assistance. Egypt's close ties with the Soviet Union provided an incentive for the United States to sell Israel military aircraft, which came in the form of A-4 Skyhawks and F-4 Phantoms. The Skyhawks arrived in late 1967. The new fighters could carry four times the payload of a Mirage III. The F-4 Phantom soon followed in 1969. The F-4 could fly farther, faster, and carry more weapons than any other fighter flown by the IAF to that point. Only a month after their arrival, F-4s were sent to attack SA-2 surface-to-air missile sites in the heart of Egypt. The F-4 became the main fighter during the War of Attrition with Egypt, Jordan, and Syria.

During this time, Israel also made plans to produce its own fighter. A production line was set up to manufacture the Nasher, an Israeli version of the Mirage V that entered



F-4 Phantoms arrived in Israel in 1969 and are still serving the IAF.

service in 1972. The Israeli-built Kfir entered service in 1975. It was an improved variant of the Nasher with an updated General Electric J79 engine and more advanced avionics.

During the War of Attrition, which began in 1969, the IAF faced a powerful and complex network of top-of-the-line Soviet surface-to-air missile sites and hundreds of anti-aircraft gun batteries. IAF raids into Egypt were often countered by showers of missiles and by deadly accurate gun barrages. The IAF lost many pilots in these attacks.

IAF pilots also faced Russian pilots who occasionally participated in the defense of Egyptian air space. Encounters between Russian and Israeli pilots reached a climax on 30 July 1970 when four Mirage IICs were sent to attack a radar base in the Nile Delta to draw the Russian pilots into the battle. At the same time, another four Mirages and four F-4s were lying in ambush at a very low altitude. The Russians sent two formations of four MiG-21s to shoot down the Mirages. A short time later, another dozen MiGs took off. In the ensuing air battle, five Russian-piloted planes were shot down. Almost 100 separate air battles took place during the War of Attrition. Israeli forces shot down eighty MiG-21s, twenty-two MiG-17s, seventeen Sukhoi 7s, and three Ilushin Il-28 bombers. Israel lost twenty-eight aircraft during the war, which ended in an uneasy peace in 1970.



The fragile peace was shattered on the morning of 6 October 1973 when Arab forces executed a coordinated all-out surprise attack on Israel in the Sinai and Golan Heights. The fighting began on Yom Kippur, the holiest day in Judaism. Squadrons of IAF Mirage IIICs, Phantoms, and Skyhawks scrambled to block the onslaught. Egyptian Tu-16 bombers fired air-to-ground missiles at Tel Aviv. Waves of MiG-17, MiG-21, and Su-7 fighters hit bases in the Sinai peninsula. Surface-to-surface missiles were also used against Israeli bases for the first time in the country's history.

The fighting went on for eighteen days. The exchanges between IAF fighters and Egyptian surface-to-air missile sites that began in the War of Attrition continued in the Yom Kippur War. Almost 100 IAF aircraft were shot out of

the skies. Many of these aircraft were front-line fighters. Eventually, the IAF managed to stop the Egyptian army and push back Syrian forces. The war ended when United Nations forces were sent to the Sinai in 1974.

The Yom Kippur War was traumatic for the IAF, which itself proved crucial in the defense of Israel. The air force also learned important lessons in intelligence, command and control, and communications. Israeli forces also made effective use of helicopters and transport aircraft during the war as well.

Israel received its first F-15 Eagles in late 1976. Less than three years later, the airplanes were downing several Syrian MiGs, beginning with a MiG-21 and then a MiG-23. An IAF F-15 also shot down a MiG-25 with a Sparrow air-to-air missile in February 1981.

F-16s arrived in Israel in July 1980. Nicknamed *Nets* for Falcon, the F-16 quickly formed the backbone of the IAF strike fighter force. The aircraft were put to use in the Osirak raid in Iraq less than a year after arriving. One year later, during the Peace of Galilee operation, F-16s took part in the elimination of Syrian surface-to-air missile sites in the Bekaa Valley in Lebanon. Over thirty sites were destroyed after only two days of missions.

After the air-to-ground attacks, IAF F-16 pilots switched to air-to-air mode and engaged Syrian MiG-21 and MiG-23 fighters. Twenty-seven Syrian MiGs were shot down in the concentrated air engagements that consumed the next three days. Not one Israeli aircraft was lost. During the



Israel received its first F-15 in 1976.



The first F-16s arrived in Israel in 1980.



The IAF has flown the Israeli-built Kfir C-2 since 1975.



The F-16 Brakeet, Thunderbolt, is used by the IAF for all-weather, night attack missions.

The Gulf War was a frustrating experience for the IAF. Israeli pilots remained on the ground as several dozen Iraqi Scud missiles were launched at Israel, destroying homes and devastating areas in several cities. The experience highlighted a need for a capability to respond to long range surface-to-surface threats. Immediately after the war, Israel requested F-15Es to deal with these threats and eventually bought the F-15I in 1994 (deliveries began this year). The F-15I *Raam*, Thunder, is used for long-range all-weather interdiction operations.

To continue its fifty years of air-superiority, Israel is currently considering new aircraft to replace aging portions of its fighter fleet. About 100 fighters are expected to be retired from 2000 to 2005. The two primary candidates for these replacements are the F-15 and the F-16. The winner of this competition will enter service in 2001 and will serve as a front line fighter for the IAF well into the new millennium. □



ensuing three months of fighting, the Syrians lost almost 100 aircraft. The only Israeli losses were a medevac helicopter, an A-4 Skyhawk, and a reconnaissance F-4 Phantom.

Israel has added to its initial order of seventy-five F-16s through the years, acquiring seventy five Block 30 F-16s in the late 1980s and sixty Block 40 F-16s in the early 1990s. Fifty more Block 10 F-16s were supplied to Israel in the mid-1990s from USAF surplus following the Gulf War.

IAF F-16s fall into four main versions: the Pratt & Whitney F100-powered F-16A, which is used for attack and for operational training squadrons; the Pratt & Whitney-powered F-16B, which is used for training and conversion courses; the General Electric F110-powered F-16C, which is used for both attack and air-superiority; and highly modified two-seat F-16Ds (also F110-powered), which are used for all-weather, night attack. Later-model F-16s are called *Barak*, Lightning. Later-model two-seat versions are called *Brakeet*, Thunderbolt.

Danny Shalom is an aviation writer based in Israel.

Canadian STARS

Article and Photos By Mike Reyno

The Lockheed T-33 T-Bird, the world's first jet trainer, took to the air on 22 March 1948 with famed Lockheed test pilot Tony LeVier at the controls. Thousands of military pilots subsequently earned their wings in this highly successful aircraft. More than fifty years after its first flight, the aircraft is still going strong over the skies of North America, serving in several combat support squadrons of the Canadian Air Force.

Canada is the last country within NATO to fly the T-Bird. The Canadian T-Bird squadrons carry out a myriad of missions, including electronic warfare support, aggressor support, primary airborne targets for NORAD alert force evaluations, real-time quality performance assurance of air defense systems, utility transport, and support to forward air controller courses.







The Canadian T-33s, like other T-33s still flying around the world, trace their roots to America's first successful jet fighter, the Lockheed P-80 Shooting Star. For many pilots, trained in slower, piston-engined aircraft, the Shooting Star was proving too hot to handle. An alarming number of planes were being lost as a result of pilot error. Mac Short, Lockheed's vice president for military aircraft, felt certain that the solution was a two-seat trainer version. Short convinced the company to fund the development program internally. Lockheed spent over \$1 million on the jet trainer, as much as it had received for the entire research, development, and test program for the XP-80.

The first T-33 was built from a P-80C. To make room for the second seat, the fuselage was extended by adding two fuselage plugs, one forward and one aft of the wing. Two Lockheed-designed ejection seats were added. The fuel tanks were modified. And the canopy was redesigned from a sliding to a hinged opening mechanism. The gun was retained to accommodate gunnery training.

The spring after the aircraft's first flight, Lockheed demonstrated the performance of its new trainer (then designated the TF-80C) at air force bases and naval air stations throughout the United States. Both services ordered production versions, the first of thousands to come. By the 1950s, the T-33 had become the primary jet trainer for much of the free world.

Lockheed manufactured a total of 5,691 T-Birds when production ended in 1959. Countless USAF, Navy, and Air National Guard pilots learned to fly in the T-Bird. Hundreds of T-33s are still flying. The T-33 served in air forces throughout Latin America, Europe, the Middle East, Africa, Southeast Asia, and the Far East. Today, T-33s serve the air forces of Bolivia, Canada, Greece, Iran, Japan, Mexico, Pakistan, South Korea, Thailand, Turkey, and Uruguay.

The Canadian history of the T-33 began in 1951 when Canadair in Montreal, Quebec, announced that it would build a new advanced trainer (designated the CL-30)



under license for the then Royal Canadian Air Force. Because of the urgency of the RCAF's jet trainer requirement, Canada ordered twenty standard Lockheed-manufactured T-Birds just after the announcement. The next year, the RCAF placed an initial order for 576 T-33s. The first Canadair-built T-Bird entered service with the RCAF in 1952.

The Canadair CT-133 Silver Star differed from its American counterpart since it is powered by a Rolls-Royce Nene 10 engine, giving the Canadian trainers a slight edge in thrust over USAF T-33s, which were equipped with the less-powerful J-33 engine. The RCAF eventually took delivery of 656 T-Birds between 1952 and 1959.

Today, the Canadian Air Force has forty-five T-33s in service with four combat support squadrons: the 414 Squadron of 19 Wing at Comox, British Columbia; the 417 Squadron of the 4 Wing at Cold Lake, Alberta; the 434 Squadron of the 14 Wing at Greenwood, Nova Scotia; and the 439 Squadron of the 3 Wing at Bagotville, Quebec. The

Aerospace Engineering and Test Establishment in Cold Lake also maintains a complement of T-Birds for various test and evaluation purposes.

Maj. Rick Boyd, commanding officer of 417 Squadron at Cold Lake, says sixty percent of the missions his unit carries out support the CF-18s based there. "We can provide the fighter squadrons with limited aggressor support necessary to hone their skills since we're capable of carrying out most of the same maneuvers as fighter-bombers, just at slower speeds," he explains. "And, despite the age of the T-Bird, it has a very small radar cross-section. Its rounded shape makes it difficult for CF-18 pilots to track us on radar."

In a time of smaller budgets, Canadian military officials realize the full value of the T-Bird's capabilities as a support aircraft. The combat support squadrons that fly them are taking advantage of that.

"We provide a specific service: to help keep combat forces (army, navy, and air force) proficient in combat

tactics,” says Lt. Col. Larry Russell, commanding officer of 434. “The T-Bird provides the best bang for the buck in what missions we can perform. The aircraft are cheap to operate, less than one sixth the operation cost of a CF-18.”

Maj. Jeff Beckett, a CF-18 pilot and operations officer at 441 Squadron, agrees. “From an economics point of view,” he says “it is a lot cheaper to put up three or four T-Birds than an equal number of CF-18s. Many of the training missions we fly require an aircraft to carry out specific maneuvers and the T-Bird is more than capable of doing that.”

Boyd, a former CF-18 pilot who led Team Canada to capture overall winner at William Tell in 1996, understands the benefits of a Combat Support squadron and the T-Bird. “The T-Bird doesn’t represent state-of-the-art technology, but don’t be fooled by its age or appearance. It’s a very capable aircraft.” The T-Bird allows CF-18 pilots to fly against dissimilar aircraft instead of other CF-18s. In the hands of a capable pilot, the T-Bird is not an easy target. “Many fighter pilots have been fooled by the capabilities of

the T-Bird and its ability to turn nose-on very quickly,” says Boyd.

Although limited in power and speed, the T-Bird can generate some tight turns and help reinforce the pilot’s need to fly his own fight. More than one pilot in more modern aircraft has been had when caught in a slow-speed turning fight with a T-Bird. The aircraft is capable of simulating various levels of threat—fighter aircraft, bomber aircraft, attack aircraft, cruise missiles, and drug ferrying aircraft. “In real-world scenarios,” says Russell, “NATO pilots fly against hostile aircraft with characteristics similar to the T-Bird. These aircraft include the MiG-17, Super Galeb, and Hawk.

“We can fly from 250 feet to 39,000 feet and can maneuver very aggressively when targeted by a flight of CF-18s,” Russell continues. “A CF-18 pilot flying fighter tactics against a simulated hostile aircraft requires a target that can change direction at more than three g’s. We can actually maneuver up to six g’s. An aircraft not capable of those



maneuvers would be easy prey, and fighter pilots would not be honing their skills. The T-Bird is the only aircraft in the Canadian Forces that can fulfill that role to the fullest extent other than another CF-18.”

“At the same time, our purpose is not always to go head-to-head with a CF-18 in a dogfight,” adds Boyd. “Mission profiles flown by a T-Bird pilot can be very specific to suit a customer’s needs. They can request specific maneuvers at specific times or leave it up to us to decide how we will deploy the formation. In some cases, they will have no idea how many aircraft they will be dealing with until the ‘fight’s on’ call.”

Tasks of Canada’s combat support squadrons are not confined to Wing operations only. The unit often supports the army and navy and has supported both German and British army training units based at Shilo in Manitoba and Suffield in Alberta, respectively. Missions with the Canadian army most often involve training forward air controllers. “We can simulate the same close air support

profiles as the CF-18 only at slower speeds,” says Boyd. “Over the course of several days, we play the role of an attack aircraft striking at simulated targets selected by the student controllers. CF-18s are brought in at the end of the course so students can get used to operating with faster aircraft.” Ground-based air defense units also benefit from the T-Bird when it is used to simulate attacking jets.

Canada’s T-33 units have increasingly supported NORAD operations in the lower forty-eight. More specifically, Air National Guard and Air Force Reserve fighter squadrons have come to know the capabilities of the T-Bird. “We simulate a threat as we would at Cold Lake,” says Capt Brehn Eichel, a T-33 pilot of the 417 Squadron. “On most of these occasions, the air-defense squadrons, which usually fly F-16s, have no idea what type of aircraft is showing up for these missions. They are taken back when we arrive on scene in an aircraft retired by their air force over ten years ago. But they quickly realize our capabilities and discover we are not easy targets.” The squadron also flies profiles to train ground-based radar operators in these missions.

Average airframe time on Canada’s fleet of T-Birds is reaching 11,000 to 12,000 hours. Originally Canadair projected a life cycle in the region of 30,000 hours. Non-destructive testing found the airframes to be good for well past the year 2015. Statistically speaking, basic limitations on the T-Bird’s reliability and serviceability are confined to the avionics. To bring the avionics suite up to modern-day standards, Kelowna Flightcraft of Kelowna, British Columbia, has been awarded a \$9 million contract to upgrade the cockpits in twenty-five aircraft with an option for an additional twenty aircraft for \$7 million.

“Our capability will go up exponentially with these improvements,” says Boyd. “We will be able to operate under most weather conditions. Likewise, the cost of maintaining the aircraft should be cut because we will have modern systems for which parts are more readily available instead of trying to maintain and repair 1950s technology.” Deliveries of the updated aircraft have begun. And the twenty-fifth aircraft should be finished by December 1998. Exercise of the options would extend deliveries to 2000. These updates will keep this well-used collection of the classic Lockheed jet trainer in the air for many years to come. □

Mike Reyno is an aviation journalist based in Canada.



Events



United Arab Emirates Selects Block 60 F-16



His Highness Sheikh Khalifa bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the Armed Forces of the United Arab Emirates, announced his country's selection of an advanced version of the F-16 in May. The announcement was made in ceremonies attended by President Bill Clinton, Vice President Al Gore, and by other administration officials and key congressional leaders. The total program, including eighty Block 60 F-16s, weapons, and support, is valued at approximately \$7 billion. His Highness Sheikh Khalifa was accompanied by His Highness Sheikh Mohammed bin Zayed Al Nahyan, UAE Armed Forces Chief of Staff.

The UAE fighter decision ends an intensive evaluation process that originally included the F-16, the F-15, the French Rafale, and the Eurofighter. The UAE is the launch customer for the Block 60—the newest version of the F-16. The advanced fighter incorporates a number of new systems and technologies for the multirole fighter mission.

The decision underscores the growing relationship between the United States and the UAE. "This decision is outstanding news for Lockheed Martin and the worldwide F-16 community. It also strengthens the valued and strategically important friendship that has long existed between the United States and the United Arab Emirates," said Vance Coffman, chairman and chief executive officer of Lockheed Martin.

"The UAE Air Force team conducted a rigorous technical and flight evaluation. They are keenly aware of their defense requirements and have thoroughly analyzed the capabilities required to meet those needs. We are particularly pleased that the F-16 met the tough standards that were established for this evaluation," said Dain Hancock, president of Lockheed Martin Tactical Aircraft Systems.

The Block 60 package consists of a range of modern systems, including conformal fuel tanks for greater range, new cockpit displays, an internal sensor suite, a new mission computer, and a new agile beam radar. A contract with the UAE is expected to be signed later this year. Aircraft deliveries are planned to begin in 2002.



Lt. Col. Steve Rainey

F-22 Raptor Flies At Edwards

The F-22 Raptor resumed active flight testing at Edwards AFB, California, in mid-May. Lt. Col. Steve Rainey piloted the craft on its first flight at Edwards and its third flight overall. Rainey is the first USAF pilot to fly the F-22 since it rolled off the Lockheed Martin assembly line in Marietta, Georgia, last summer.

"The aircraft handled like a dream," Rainey said. "It's the best flying aircraft I have flown, and it sets a new standard of excellence in fighter aviation." The test flight met three objectives: expanding the flying qualities envelope, testing the handling qualities of the speed-brake, and evaluating formation flying qualities.

Rainey said each of the three test points was flown precisely as briefed and that the flight was a successful test mission. The aircraft remained aloft one hour and twenty minutes and returned "Code One" condition, ready to fly again. General speed of the aircraft was at or below 350 knots; it was accompanied during all phases of flight by an F-15 flown by Lockheed Martin test pilot Paul Metz, the first person to fly the F-22.

This first aircraft, officially referred to as Aircraft 4001, will undergo roughly fifty test flights before the second F-22 (Aircraft 4002) is delivered to Edwards. Aircraft 4002 made its first flight at Lockheed Martin Aeronautical Systems in Marietta in July. The second F-22 is scheduled for delivery to Edwards this fall. Nine F-22s are slated to become part of the F-22 test fleet at Edwards.

C-130J Completes World Tour



Lockheed Martin's C-130J World Team returned home in May after a ten-hour, fifty-two-minute, unrefueled non-stop flight from Honolulu, Hawaii. The 4,000-mile flight set an unofficial record for the C-130 for longest flight without external fuel tanks. The world tour took the C-130J to stops in the Middle East, South America, Pacific Rim, Europe, and Canada for a total of thirty-two countries on six continents.

"We are nearing completion of flight test on the C-130J program and the start of deliveries to initial customers, so it is a perfect time to demonstrate fully the increased capability of this aircraft," said Rick Hundley, vice president of international business for Lockheed Martin Aeronautical Systems. "We want as many air force operators and maintainers as possible to experience first-hand the advanced technologies and money-saving improvements we've incorporated into the C-130J."

The C-130J and the longer C-130J-30 are completely new versions of the popular airlifter. Orders for the new aircraft have been placed by the British Royal Air Force, Royal Australian Air Force, Italian Air Force, US Air Force, and US Marine Corps.

VISTA/F-16 Aircraft Used In JSF Flight Control Tests



Lockheed Martin has begun testing the flight control software for its X-35 Joint Strike Fighter concept demonstrator aircraft in flights conducted with the Variable Stability In-Flight Simulator Test Aircraft, or VISTA/F-16. The VISTA/F-16 crew of John Ball and Jeff Peer of Calspan completed all the planned test points in the first VISTA flight for the X-35 development program in Buffalo, New York, in late March. The test points included commands in all flight axes—pitch, yaw, and roll. These maneuvers were completed in up-and-away flight and during one landing in a power approach mode. The first flight began the calibration process of tuning the VISTA/F-16 to match the dynamic response characteristics of the Lockheed Martin JSF demonstrator aircraft.

The expected responses are derived from wind tunnel data and computer modeling. The VISTA/F-16's response characteristics will be refined in several calibration flights, before evaluation of handling qualities begins in subsequent test flights. In the upcoming evaluation phase, four pilots (two Lockheed Martin, one US Navy, and one US Air Force) will evaluate the guidelines for handling qualities that are being used to design the X-35 flight control system. Evaluation maneuvers consist of realistic tasks, including simulated carrier landing approaches, aerial refueling, air-to-air tracking, and formation flight.

Once established, the control system design guidelines will be used by engineers and test pilots to refine the actual flight control software for the X-35 aircraft. The two X-35 demonstrator aircraft are scheduled to be evaluated in the year 2000.

The VISTA/F-16 is a one-of-a-kind advanced testbed with flight control computers that can be programmed to replicate the flying qualities of other aircraft. The aircraft is a USAF Research Laboratory asset operated by Calspan, which supplies the aircraft's variable-stability flight control system. The VISTA/F-16 has been used previously to validate F-22 flight control laws. The aircraft was also used in flight tests to demonstrate an operational thrust-vectoring engine nozzle in 1994 and to demonstrate an adaptive control system in 1996.



Lockheed Martin JSF Demonstrator Takes Shape

Lockheed Martin's Joint Strike Fighter concept demonstration aircraft program reached a milestone in May as airframe assembly began at the Skunk Works in Palmdale, California. Assembly started with the wing carry through structure of the aircraft, called the X-35.

"Our aircraft is taking shape," said Skunk Works product manager Rick Baker. "Now we can watch the next-generation strike fighter grow step-by-step as we move toward rollout and flight test." In line with achieving an agile tooling objective for the demonstrator aircraft, Baker said the airframe assembly and mate takes place in the same tooling—a large framework used to position the aircraft as it is built. The first of two full-scale demonstration aircraft being built at the Skunk Works will reach final assembly later this year. The second aircraft will start assembly immediately after in the same tooling, thereby demonstrating the company's airframe commonality objective.

The powerplants for the X-35 are also taking shape. The JSF 119-PW-611 main engine successfully completed its first run at Pratt & Whitney facilities in West Palm Beach, Florida, on 11 June. The 611 will power both variants of Lockheed Martin's JSF. Initial testing of the lift fan system's clutch, fan, and gearbox was conducted at Rolls-Royce Allison a month earlier at the company's Indianapolis, Indiana, facility. The lift fan will be used to power the Lockheed Martin JSF variants for the US Marine Corps and the United Kingdom Royal Navy.

Singapore Accepts First Block 52 F-16

The first Block 52 F-16 produced for the Republic of Singapore Air Force was delivered in ceremonies in May at Lockheed Martin Tactical Aircraft Systems. Lt. Gen. Bey Soo Khiang, chief of the Singapore Defense Forces, formally accepted the Fighting Falcon. The aircraft delivered is the first of eighteen Block 52 F-16C/Ds that will be added to the Republic of Singapore Air Force. Singapore took delivery of eight F-16A/Bs in 1988, as one of fourteen countries that has placed repeat orders for F-16s. The new state-of-the-art F-16s will be delivered throughout the year and will serve as a formidable addition to the F-16A/Bs that have served Singapore for the past ten years.



NASA F-16XL Goes Digital



NASA's F-16XL No. 1 research aircraft has completed the flight verification of a recently installed digital flight control system at NASA Dryden Flight Research Center at Edwards AFB, California. The F-16XL upgrade provides NASA a testbed aircraft with a flexible digital flight control system that simplifies experiments requiring major new flight control functions or capabilities. The test objectives for the modified aircraft were met with ten flights that verified the functionality of the digital controls and the

performance and handling qualities of the modified airplane.

"We're very pleased to have completed the flight evaluation of the digital flight control system upgrade," said Jerry Budd, NASA's manager for the project. "The aircraft and the new control system work very smoothly together and have proven to be a good combination," Budd said.

The digital system uses electronic flight controls coupled with a digital computer, replacing the F-16's original analog computer. The flight control system modification is equivalent to the USAF F-16 upgrade known as Block 40. The aircraft's fly-by-wire flight control system remains intact. The added flexibility of the new system increases the versatility of this aircraft as a testbed for aerodynamic research and for investigating other advanced technologies.

NASA's two F-16XL aircraft were modified with unique delta wings during the 1980s for other flight research projects. The XL No. 1 aircraft, tail number 849, has the newly added digital controls. NASA 849 was one of the first pre-production, or full-scale development F-16s, produced for the USAF and was acquired by NASA in the 1980s. The No. 2 F-16XL, tail number 848, recently completed NASA's successful Supersonic Laminar Flow Control flight research project.



World's High-Hour F-16?

Personnel at the F-16 Combined Test Force at Edwards AFB have what they believe is the high-hour F-16 in the world. The F-16B No. 78-008 surpassed the 5,000-hour mark in June 1997. The aircraft most recently made the headlines when it was used as a chase aircraft for Chuck Yeager's fifty-year anniversary reenactment last year of his breaking of the sound barrier in October 1947. Retired USAF test pilot Bob Hoover, Yeager's chase pilot for the original record, flew the F-16 chase during the reenactment. No. 008 has also been used to test the Maverick missile; chase the B-1, B-2, and C-17 during test flights; chase air-launched cruise missiles and the Global Hawk unmanned reconnaissance vehicle; and train pilots in high angle-of-attack flight. The aircraft was also one of two F-16s from Edwards to chase the F-22 on its maiden flight in Georgia last September.



Col. James Doolittle (USAF, retired) and Bob Hoover (right) chased Chuck Yeager in the high-hour F-16 at Edwards as Yeager reenacted the X-1 sound barrier flight last October.



Franklin's Final Flight

As a lieutenant, he instructed young pilots. As a captain, he trained ally pilots to fly during the Vietnam War. As a general, he was responsible for sending troops into combat situations. Yet admittedly, 8 May was one of the toughest days in Lt. Gen. Carl Franklin's military career. This was the day when he flew his last sortie in a military aircraft. Franklin, Commander of the 9th Air Force and US Central Command Air Forces, approached the event with mixed emotions. For a brief moment, the general let down his stoic demeanor to discuss his love of flying. "To think I won't climb into a fighter again obviously brings thoughts of great sadness. But as I look back over some 3,800 hours flying time, I lessen that feeling with thoughts of the things that really make a fighter pilot smile—exhilaration, danger, speed," he said. "I wanted to take advantage of every drop of gas I had. I didn't want it to end. I've had a wonderful thirty-three years in the Air Force and it's time for me to step out and let the young guys step in."

As a surprise, members of 9th AF arranged for Capt. Greg Franklin, the general's youngest son, to accompany his father on his crowning flight. The captain is currently on a one-year remote assignment to Osan AB in South Korea, where he flies F-16s. Lt. Gen. Franklin said he was pleasantly surprised and very pleased when he found out Greg would be joining him in the four-ship formation. Likewise, the younger Franklin was thrilled when asked to participate. "I honestly can't think of a better way to honor my father and show him how proud I am of him than to fly with him. It's just great that I have the opportunity," he said.



PHOTO RANDY CRITES AND NEAL CHAPMAN / LMTAS

Eielson Flexes Multirole Muscles At Tyndall

The 18th FS from Eielson AFB, Alaska, deployed twelve F-16s and nearly 150 people earlier this year to Tyndall AFB, Florida, for back-to-back exercises that tested its weapons and how well its pilots use them.

The squadron worked with the 475th Weapons Evaluation Group there in Combat Archer and Combat Hammer exercises, which test F-16 weapons against flying and ground targets, respectively. The squadron is the first unit to participate in the exercises back-to-back. Combat Hammer is normally run at nearby Eglin AFB, Florida. In Combat Archer, the twenty-six deployed pilots fired AIM-9 and AIM-120 missiles at unmanned flying drones over the Gulf of Mexico.

As soon as Combat Archer ended, the unit tested its bomb-dropping efficiency in Combat Hammer. F-16s dropped GBU-12 bombs on simulated ground targets. During the deployment, Eielson pilots also achieved another Tyndall first. At the beginning of Combat Hammer, two F-16s flew armed with both missiles and bombs, testing their accuracy against air and land targets in the same sorties. The unit learned several important lessons, including the feasibility of a combined deployment at a single site with considerable advantages in training efficiency and with potential savings in operation and maintenance.



Gulf War POW Returns To Iraqi Skies

Lt. Col. Bill Andrews, deployed commander of the 389th Expeditionary Fighter Squadron, returned to Southwest Asia recently to support Operation Southern Watch. A little more than seven years ago, he became a prisoner of war in this same area of responsibility during Operation Desert Storm when the F-16 he was piloting was shot down two days before the Gulf War cease fire. "It was my 35th mission," he said. "I was captured by the Republican Guard and imprisoned in Baghdad." True to his military training and the Code of Conduct, Andrews escaped once but was recaptured. (His journal was published in the January and April issues of *Code One* in 1992.)

Following his repatriation and return to flying status, Andrews spent about six years away from a combat unit. He taught at the F-16 schoolhouse at Luke AFB in Arizona, attended Air Command and Staff College, and held a staff job at Air Combat Command headquarters.

His transfer to Mountain Home AFB, Idaho, in June 1997 provided him with an opportunity to return to Southwest Asia and fly combat missions. "It was important for me to come back," he explained, "though coming to grips with the idea of coming back and flying over Iraq again wasn't easy."

Andrews wasted no time once he arrived in Bahrain. "The first mission the T-bolts flew, I was in it," he said. Instead of apprehension, Andrews said he was really energized, aware of the situation and the possibilities, and glad to be a part of it.

The setting may be nearly the same as seven years ago, but Andrews says he isn't. "I feel a little older and a little wiser since I was shot down," he said. "I'm aware of the possibilities, but flying the mission occupies my mind with so many complexities and so many things to do. I get on and do the mission the best that I can."

Andrews and his present unit are focused on getting the job done. "The T-bolts are here to protect other coalition planes," said Andrews proudly. "We're here to do the suppression of enemy air defense mission."



Astronaut Buzz Aldrin Flies F-16 With His Former Squadron

Apollo XI astronaut Buzz Aldrin added another aircraft to his logbook in April when he took to the skies in a Block 50 F-16 of his former squadron, the 22nd FS at Spangdahlem AB in Germany. Long before Aldrin made history with Neil Armstrong as one of the first two men to step on the moon on 20 July 1969, he was the D Flight commander in the "Big 22," flying F-100s while stationed at Bitburg AB from 1956 to 1959.

Lt. Col. Charlie Lyon, the current commander of the 22nd FS, flew with Aldrin. On their wing was Capt. Terry Virts, the current D Flight commander. In addition to experiencing the F-16 firsthand, Aldrin gave an inspiring presentation as the guest speaker at a dinner hosted by the squadron. At the age of 68, Aldrin admitted he doesn't spend much time golfing, but rather is promoting his latest book, *Encounter with Tiber*. He is also working on reusable rocket booster designs and plans for exploring Mars.



Aldrin (center) celebrates his first F-16 ride with Capt. Virts (left) and Lt. Col. Lyon of Aldrin's former 22nd Fighter Squadron.



Joe Bill Dryden Award: Call For Nominees

Nominations are now being accepted for this year's Semper Viper Award for Outstanding Airmanship. The award pays tribute to pilots demonstrating airmanship skills noteworthy of its namesake, the late Joe Bill Dryden. A selection panel from Lockheed Martin Tactical Aircraft Systems will evaluate candidates who carry on Joe Bill's tradition of excellence in airmanship and system knowledge. The winner of the 1997 award was Maj. Frank DeWinne, a senior flight test pilot of the Belgian Air Force.

Candidate applications for the 1998 award should be mailed to the *Code One* editorial office (see page 1 for the address). Applications should include complete information describing particular missions or outstanding aviation skills demonstrated by the nominee. Receipt of nominations will be acknowledged by the selection panel.

Plaudits From Air&Space

Congratulations from all of us on your recent *Code One* feature, "F-22 Design Evolution." The staff here reads *Code One* cover to cover every time, but we just had to tell you that this particular story was world class! Again, congratulations.

George C. Larson, Editor
Air&Space/Smithsonian Magazine
Washington, DC

Editor's note: The latest issue of Air&Space features an article on the F-22 Raptor as well.

Live People On A Deadline

The April 1998 issue of *Code One* arrived in my mailbox today, and I was immediately impressed with your "F-22 Design Evolution" article, which is an excellent example of the aircraft conceptual design process. Aircraft design textbooks discuss conceptual design but fall far short of describing the complex mix of contracts, companies, technologies, and people required to generate a next-generation military aircraft. Aerospace Engineering students are rarely exposed to this kind of factual real-world historical information, so I felt an urge to show "F-22 Design Evolution" to my current senior class.

Thus, a phone call to your office and the pleasant surprise of getting a real person on the line! Thanks for providing a few extra copies of this magazine for the students in this spring's and next fall's classes.

Thanks and congratulations on producing a very interesting and useful publication.

L.B. Scott, Jr., Professor
College of Engineering
University of Arizona, Tucson

Employee Potential

I truly enjoyed your article about the F-22 Raptor's design evolution. It's hard to believe that it took that many drawings and designs to finally get the F-22 that made its first flight last fall. I'm actually surprised it took that long for the first flight to occur since the dem/val phase of the program. But I guess it takes a lot of planning, redesigning, and testing before you can get an aircraft with so much technology in the air.

The F-22 and F-16 are my favorite fighter aircraft. I hope you could do a story on the F-16's design evolution and maybe even something about the test program. In a few more years, after I get out

of high school, I want to go to college and get a degree in aeronautical/aerospace engineering. I was also thinking about becoming an Air Force test pilot. I love to draw. Maybe some day I'll end up designing aircraft for Lockheed Martin. Oh, tell Price Randel and Dan Erdmann they do the best illustrations ever.

Dan Truax-Terwilliger
Andrews AFB, Maryland

Editor's note: We have a Harry Hillaker briefing on the F-16 design evolution in the files, waiting to be transformed into a similar article. Stay tuned.

Archivists Unite

I recently saw the April '98 issue of *Code One*. You really got my attention big time with the lead article on the F-22 design evolution. As a sort of aviation historian, I am fascinated by that area of conceptual engineering. I really go for the design studies, program proposals, and design variants and collect this kind of data whenever I find it. I find it kind of interesting that most of the mainstream history establishment looks down on this sort of info as paper, not real, and therefore not worthy of much attention.

I worked at GD/Space Systems for thirty-five years and retired in 1993. After that, I started volunteering at the San Diego Aerospace Museum library, which by the way is quite good. Before leaving San Diego, GD donated two excellent photo archives and a fair amount of historical documentation to the museum. I am the archivist for the documentation and one of the photo archives (for the Space Systems Division). Guess it's amazing that as much survived as we ended up with. I'm sure you have recognized the "intense" interest companies have in preserving their history. I suspect that when things are saved, it is due to interested individuals rather than any policy or procedure. In any case, this is a long-winded way to say I really enjoyed the article.

Robert E. (Bob) Bradley
San Diego, California

McDonnell Who?

I just finished reading your article in *Code One* on the design evolution of the F-22. Very nice. I was particularly impressed by the number of background illustrations that you included. They added a great deal to the article. I also think that all "airplane people" are curious to see what other airplane people are thinking about.

However, as a member of the competition, I thought that your otherwise very thorough article was marred by the nearly complete lack of mention of both Northrop and McDonnell Douglas. Much of the environment surrounding ATF in the '80s was, I think, traceable to the

swirling interaction of all of the contractors. Without a sense of that interaction, I think you missed the last, best ten percent of historical hindsight. In addition, some of the changes in requirements which you attribute to the Air Force came, in fact, from Northrop studies (and I believe that is relatively common knowledge from this point in time). Certainly, enough Northrop and McDonnell Douglas people now working at Lockheed can make this part of the history easy to ferret out. However, carping aside, I compliment you on an article well done, and I look forward to Part II.

Steve Seto (formerly YF-23A)
Boeing
St. Louis, Missouri

Lightning Strikes Twice

Just a quick note to let you know how much I enjoyed your article in the April '98 issue about the evolution of the F-22 design. My son, who hopes to someday fly the Raptor, enjoyed it as well.

The article led both of us to a question: Was the F-22 ever referred to, officially or otherwise, as the Lightning II? Several of my coworkers and I distinctly remember the name being used early in the flight test program, but no one is sure whether or not it was sanctioned by the Air Force or simply used by Lockheed Martin for publicity purposes.

Once again, my compliments on an excellent article and an outstanding publication.

SSgt. Mike Kozlowski
Shaw AFB, South Carolina

Editor's note: Lightning was attached to the YF-22 when it was flying during the dem/val phase of the program. Lightning II was a name favored by the Skunk Works at that time. Only Raptor has been officially sanctioned by the Air Force.

No Pulitzers For Corporate Writing

The article on the design evolution of the F-22 is the best article of its type that I've ever seen. If you don't get a journalistic award for that one, there's something wrong. I am looking forward to Part II.

Has any of the work on the Lockheed submission into the B-2 competition ever been released? I've read Ben Rich's book and would love to see what that bird looked like. Keep up the excellent work. You've set high standards based on the work done to date!

John Poparad
Arnold AFB
Tennessee

Editor's note: To our knowledge, no information on the Lockheed submission for what became the B-2 bomber has been publicly released.

Downing Der Rote Kampfflieger

Your "F-22 Design Evolution, Part I" article mentions Manfred von Richthofen, World War I's Red Baron. The way it is worded, the paragraph gives the impression that von Richthofen was killed when he got into a maneuvering engagement that violated his own precepts. This is not a clear enough description of what happened. Von Richthofen was shot down by ground troops when he flew over the trenches at too low an altitude. He was not shot down by another aircraft as the paragraph implies.

Michael V. Stratton
Ashburn, Virginia

Editor's note: Uncertainty surrounds the demise of Richthofen. He had just finished a protracted air-to-air engagement with Australian pilot Arthur "Roy" Brown. Whether he died from wounds received in that fight or from small arms fire from the ground has never been proven conclusively. The point of Moran's comments in the article is that Richthofen was violating his own precepts about avoiding extended maneuvering engagements when he was shot down. The true source of the fatal shot, from the ground or air, does not lessen that point.

Lindbergh's Influence

Thanks so much for *Code One's* super outstanding presentation of the National Museum of Naval Aviation. Your photos and review show the historic evolution of naval aviation and its development throughout the century.

The museum is very proud of its NC-4, the original plane that made the first successful flight across the Atlantic Ocean in 1919. Many think that the historic flight inspired the young Charles Lindbergh, who later crossed the Atlantic to Paris in his famous *Spirit of St. Louis*. *Code One* can be proud that it presents the very best in aviation for its readers around the world.

Art Radige
Pensacola, Florida

Correctional Commendations Corrected

This is in reaction to Layne Robinette's "Correctional Commendations" letter in the terrific April 1998 issue of *Code One*. Layne says that the 466th TFS of the 419th TFW (Air Force Reserve) at Hill AFB was the first non-active-duty unit to receive the F-16 Fighting Falcon instead of the 157th TFS of the 169th TFG at South Carolina's Air National Guard. I am afraid that I have to disappoint Layne, as the 157th TFS was indeed the first non-active-duty unit to receive the F-16. Their first aircraft arrived at Shaw AFB (the 363rd at Shaw was their parent unit) on 30 March 1983 as a maintenance



trainer, followed by a second F-16 on 5 April 1983 for the same purpose. The first F-16 to arrive at McEntire ANGB and the third for the squadron came on 8 April.

The 466th TFS at Hill received its first two F-16s on 16 October 1983 as maintenance trainers, and the first "real" F-16 arrived at this Reserve unit on 23 January 1984. The first USAF F-16 unit, the 388th TFW at Hill, received its first F-16 on 15 November 1978 as a maintenance trainer. The 388th received its first combat operational F-16 on 23 January 1979.

Theo Van Geffen
Utrecht, The Netherlands

Focusing Night Visions

The two [January 1998] articles on NVGs and NVIS at Aviano were great. We at Aviano are fortunate to be on the leading edge of this addition to the Block 40 F-16's combat capability.

As with any new technology or addition to an aircraft, this system has had a few bugs for us to work out. However, our NVIS technicians, coupled with some great support from the Lockheed Martin modification team, have really smoothed the way. The modification of the fleet went faster and we encountered fewer problems than we originally anticipated. Towards the end of the mod program, the NVIS transition was almost transparent (other than the scheduling challenge of losing an aircraft for five to six days).

Our only real shortfall has been rallying enough support for continuous spares support within the Air Force supply system. Currently the wing has a very limited supply of spare parts and is limited to buying spares directly when these parts run out. We are soliciting the assistance of the USAFE staff to procure a budget for more NVIS spares and to incorporate these parts into the USAF supply system. But, as always, we are competing against everyone else's priorities.

As more and more Block 40 units adapt to NVGs and NVIS, I foresee an increasing difficulty of obtaining spare

parts. Increased discussion and visibility on the capabilities (and problems) associated with this system can only help those of us in the field. Your articles on the NVGs and their tremendous capability will help highlight this system and the immediate issues concerning it.

Capt. Andy Bouck
510th FS
Aviano AB, Italy

NATO's Bright Future

I am a seventeen-year-old boy. I hope you can translate what I am writing, as unfortunately my English is poor, since I haven't studied it for very long. I am writing to inform you that your magazine is available in Hungary, and I want to let you know how much I like it. Although there is a lot I don't understand, I enjoy the photos of the aircraft. I like all things related to aircraft. One day I might be a pilot, though this is not easy in Hungary. The requirements and the number of candidates are high. The situation might change once we become NATO members.

Peter Kovacs
Budapest, Hungary



The Belgian Air Force dressed its demonstration F-16 in white for the 1998 show season. Dubbed "White Falcon," this F-16A will be piloted by Cdt. Danny Meersman of the 31st Tiger Squadron at Kleine Brogel Air Base. Photo by Dirk Geerts/APA.

We'd like to hear from you. Send letters to:
Editor, *Code One Magazine*
Lockheed Martin TAS
PO Box 748/Mail Zone 1224
Fort Worth, Texas 76101

E-Mail: eric.hehs@lmco.com



CODE ONE

LOCKHEED MARTIN 