

2025

The *Program Guide*

F-16 & OTHER JETS

The
Awesome
“New”

F-15EX

WHAT'S INSIDE:

- Advances in Technology & the Supplier Base
- Valued Viper Variations & More
- Portugal and its Air Force
- Worldwide Fleets
- Company Profiles

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EUROPE'S FIGHTER JET SUSTAINMENT BOOM: A QUIET REVOLUTION

As Europe's defense priorities shift in response to global instability, the continent's fighter jet sustainment and modernization industry is quietly expanding—fueled not just by governments and OEMs, but by a growing ecosystem of specialized suppliers and MRO firms.

Modernization programs for the Eurofighter Typhoon, Dassault Rafale, and older platforms like the F-16 are creating long-term demand for electronics upgrades, structural overhauls, and digital systems integration. But it's the lesser-known companies that are increasingly critical to keeping these jets combat-ready.

Take *Patria Aviation* in Finland, which supports F/A-18 Hornet maintenance and is expected to play a role in upcoming F-35 sustainment. In the UK, *Hesco Engineering* supplies critical legacy components. Over in Switzerland, *RUAG MRO International* provides lifecycle support for both Western and legacy Eastern European fleets.

Germany's *Diehl Aviation* and Spain's *Indra Sistemas* are key in avionics and sensor retrofits, while Italy's *Leonardo* has spun off smaller subcontractors handling radar servicing and electro-optical systems. Also in Italy, *AEREA S.p.A.* supplies key pylons and ejector rack systems used on the Typhoon and other aircraft, supporting weapons integration and upgrade programs.

Additionally, *Liebherr-Aerospace*, based in Germany and France, known primarily for civilian systems, has become a go-to supplier of flight control and environmental control systems for various European military platforms.

NEW SOURCES FOR TECH

Meanwhile, additive manufacturing is transforming parts replacement. Dutch firm *KMWE Precision* produces titanium components for fighter engines using 3D printing—faster and cheaper than legacy methods.

Digitization is further accelerating this trend. Predictive maintenance, driven by AI and big data analytics, is helping small firms compete. Companies like *AerData* offer software that tracks part life cycles, monitors engine health, and optimizes logistics—essential for cost-effective sustainment. Over in Spain, *CT Ingenieros* provides crucial engineering support and digital twin technologies, helping air forces simulate maintenance schedules and reduce aircraft downtime.

NEW SOURCES FOR SUSTAINMENT

MRO centers themselves are growing in strategic value. *Airbus's facility* in Manching, Germany, has expanded to handle Typhoon upgrades and structural overhauls. *Marshall Aerospace* in the UK is growing its military sustainment services, not just for the RAF but for other allied air forces as well.

NEW SOURCES FOR PARTS

Air forces and repair shops around the world are increasingly seeking out European parts resellers. *Artemis Aerospace*, located in West Sussex, England, offers 24/7 customer service. *Aerostar* in Romania supports that country's air force and has F-16 parts available off the shelf. *Hellenic Aerospace Industry* in Greece is certified by Lockheed Martin and Rolls-Royce. *NEDAERO* in the Netherlands supplies critical parts from their inventory and *SABCA* in Belgium has been a steady supplier of F-16 equipment on the continent for years.

This fragmented yet growing sector benefits from EU defense collaboration initiatives, especially the European Defence Fund, which incentivizes cross-border maintenance capabilities.

As Europe braces for longer-term geopolitical challenges, having a resilient domestic sustainment industry is no longer optional. This trend also signals a shift away from overdependence on U.S.-based logistics pipelines. By investing in these smaller yet vital players, European nations are not just maintaining fighter fleets—they're fortifying sovereignty.

The next war may still be fought with jets—but it will be won in the factories, hangars, and test benches of companies most people have never heard of.

Richard Greenwald

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F-16 & OTHER JETS 2025

"COVENANTS, WITHOUT THE SWORD, ARE BUT WORDS"
THOMAS HOBBES, 1651



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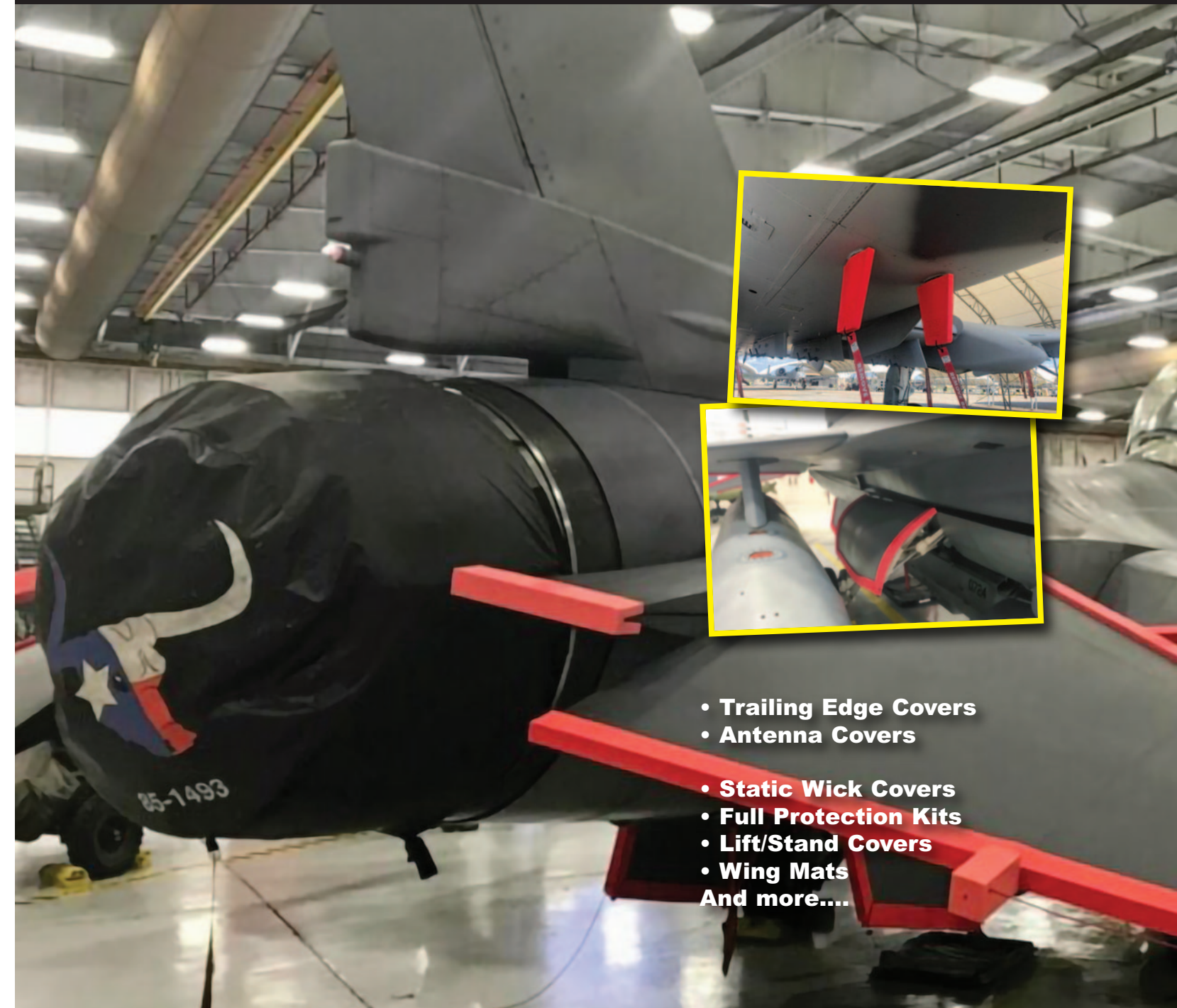
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The first F-15EX at St. Louis Lambert International Airport in Missouri. (Image courtesy of Boeing.)

The F-15EX, the Air Force's newest fighter aircraft, arrives at Eglin Air Force Base, Florida on March 11. The aircraft will be the first Air Force aircraft to be tested and fielded from beginning to end through combined developmental and operational tests. The 40th Flight Test Squadron and the 85th Test and Evaluation Squadron personnel are responsible for testing the aircraft. (U.S. Air Force photo/Ilka Cole)

THE AWESOME “NEW”

F-15EX

The Fierce F-15 Eagle Gets a Makeover

By Jeff Blundell

It was a perfect day in the Florida panhandle. The wind was calm, and the blue sky was free of clouds, as the U.S. Air Force's latest fighter jet lifted off from the runway at Eglin Air Force Base.

"I'll tell you first and foremost, it was a blast." That is how Major Tyler Heck describes the first time he flew an F-15EX. "We did a quick climb, followed by a beach run at about 1,500 feet, just following the coastline and looking at the local area. I remember looking outside and thinking, 'This is awesome!'"

Heck, a U.S. Air Force pilot with 10 years of experience, has logged more than 1,500 hours in the F-15E. As of this writing, he

also is one of only a handful of people to have piloted the new EX model. As such, he is the perfect person to talk with about the differences in capabilities between the two aircraft.

NEW VERSUS STATE-OF-THE ART DERIVATIVE

But first, what exactly is the F-15EX? Is it a new plane? Or is it a re-imagining of an older airframe?

"It is a derivative," confirms Kurt Schroeder, Boeing's Program Director for the F-15EX. "It is the newest derivative of the F-15, and it has a lot of new features." Schroeder estimates that about 25 percent

of the plane's components are new.

"What we have done," Schroeder explains, "is to keep a lot of what makes the Eagle, the Eagle: its size, its speed, its payload capability. All the things that make it a great aircraft are still there. Meanwhile, we've added new and better mission systems and sensors, integrated different weapons, and made it easier for the pilot to fly and do their missions."

"So, it is a derivative of previous F-15 versions, but it is state of the art," he concludes.

The decision to go with a derivative over a brand-new plane has the industry buzzing, but the comments about this

F-15EX Specifications

- Engines: two General Electric F110-GE-129 afterburning turbofans
- Height: 18 feet 6 inches
- Length: 63 feet 9.6 inches
- Wingspan: 42 feet 9.6 inches
- Wing area: 608 square feet
- Empty weight: 34,600 pounds
- Maximum payload: 29,500 pounds
- Maximum takeoff weight: 81,000 pounds
- Maximum speed: Mach 2.5
- Operational ceiling: 60,000 feet



Kurt Schroeder is Boeing's Program Director for the F-15EX. (Images courtesy of Boeing.)

to the F-15E, and all those new elements had to be tested and certified. So, when you look at the price tag that the U.S. Air Force pays for an F-15EX and compare it to an F-35, for example, it's not necessarily a cost savings up front."

"There was a lot of skepticism on the part of lawmakers in Congress about this concept, because it's a derivative of a fourth-generation fighter that was designed during the Cold War," Finnerty continues. "They wondered, 'Why are we paying all of this money for a non-stealth fighter, when we could be buying an F-35 for an equivalent price?'" But buying fighter jets is a multi-layered decision.



A former U.S. Army officer, Ryan Finnerty covers military aviation and the defense industry for FlightGlobal.com. (Image courtesy of Ryan Finnerty.)

“Cost was originally a factor, but so was the production time,” says Peter Suci, a journalist who writes for both The National Interest and Forbes.com. “The existing fleet of F-15 Eagles is aging, and a replacement is needed. The F-35 simply takes too long to produce, and the fact that the Eagle II can be produced quicker played a major role in the decision.”

That is probably what has industry insiders most excited. Boeing has created a powerful “new” fighter jet in a tiny fraction of the time it would have taken to develop, build, and test a whole new design.

“If you start from scratch, you have to

put the entire design through rigorous testing. Whereas, if you are taking an existing design and changing it, you only need to do certification and testing of the changes,” Suci points out. “You can have airplanes ready to deliver to the customer much quicker that way.” As a result, the turnaround time of the F-15EX program was record setting.

Boeing recognized that the U.S. Air Force needed a mid-tier fighter that could work in concert with fifth-generation aircraft and supplement their missions. Within 12 months of signing the contract in 2020, the first two F-15EXs were delivered.

“We actually pulled what would have been a couple of F-15 jets for Qatar out of the production line when they were already mostly built. Then we made the modifications that were necessary to make those into EXs, and then delivered them,” says Schroeder.

A lot of the time savings come from optimizing the manufacturing process. Boeing has contracts with more than 500 suppliers to make parts for the new jets. Those components are then shipped to St. Louis for assembly.

For some sections of the aircraft, a process known as “full-scale determinate

assembly” is being used. This approach, enabled by the accuracy of modern production methods, enables suppliers to deliver tight tolerance parts that are ready to install with simpler tooling and fixtures.

The list of companies involved in supplying those “ready-to-install” components is extensive and includes many of the big players in the industry. That list starts with GE Aviation, which supplies the F110 engines for the F-15EX. Brek Manufacturing makes large, complex, machined parts, such as longerons for the center fuselage, and beam and spar assemblies for the wing. Collins Aerospace,



Peter Suci covers military aviation and industry news for both The National Interest and Forbes.com. (Images courtesy of Peter Suci.)



There are currently only eight F-15EX aircraft in service, but a new lot is currently in production. (Photo by Samuel King, Jr., courtesy of the U.S. Air Force.)



The F-15EX Eagle II aircraft can launch missiles from two new weapon stations, known as Stations 1 and 9. (Image courtesy of the U.S. Air Force.)



Eglin Air Force Base accepted its sixth F-15EX Eagle II fighter aircraft Jan. 26, 2024, at Eglin AFB, Fla. The 53rd Wing now has four and the 96th Test Wing has two as the units continue joint developmental and operational testing on the Air Force’s newest fighter aircraft. (U.S. Air Force photo by 2nd. Lt. Rebecca Abordo.)



The F-15EX (left) sits beside an F-15E Strike Eagle (right) at Eglin Air Force Base in Florida, where the 40th Flight Test Squadron and the 85th Test and Evaluation Squadron personnel test the aircraft. (Photo by 1st Lieutenant Karissa Rodriguez, courtesy of the U.S. Air Force.)



The 96th Aircraft Maintenance Squadron, seen here carrying an AIM-9X missile, is responsible for looking after the U.S. Air Force’s newest fighter. (Photo by Samuel King, Jr., courtesy of the U.S. Air Force.)



Senior Airman Mathew Morava, a member of the 96th Aircraft Maintenance Squadron, secures fins onto an AIM-120 missile during a weapons load competition. (Photo by Samuel King, Jr., courtesy of the U.S. Air Force.)

meanwhile, is providing boltless wheels and carbon brakes for at least the first three batches. GKN Aerospace, one of the international partners, produces structural components and assemblies for the jets.

“In some ways, the way we build the jet is still pretty similar to the original, and then there are some areas that are much more advanced and use newer technology,” says Schroeder. “So, as an example, in the aft fuselage, we are still dependent on two-dimensional engineering. There’s a lot of titanium back there, due to the stresses when the jet’s flying. We’ve made some minor improvements, but, by and large, it’s still built similarly to how it was decades ago. But then there are other parts of the jet, such as the wing and the forward fuselage, that have been redesigned to be very modern. We use 3D model-based engineering.”

Just a couple of months after they were delivered, the first two aircraft were active in Northern Edge, a multinational, multi-service training exercise in Alaska. The exercise put the brand-new planes in the air alongside an array of jets from the U.S. Air Force, U.S. Navy, U.S. Marine Corps, U.K. Royal Air Force, and the Royal Australian Air Force. The performance reviews were exceptional. That is crucial, because none of the financial or time savings would matter if the plane was not fit for modern-day combat situations. The early reports suggest that it is potentially a game changer.

SO, WHAT’S NEW?

The difference pilots notice first are the advanced avionics. The EX’s cockpit includes three full-color monitors. In the F-15E, only one was in color.

“The 10-inch by 19-inch display is all touch screen,” says Heck, referring to the primary display. “Being able to touch the screen and move certain information pieces around was definitely interesting to get used to. Also, the head’s-up display (HUD) is different. The HUD is a lot narrower in the EX.”

Another dramatic change is the fly-by-wire control system. “That’s the biggest difference when you are flying the aircraft,” notes Heck. “The entire control system is handled by the zeros and ones in the computer. Whereas the original F-15E is hydraulic piston and pulley driven. So learning the difference between the two and kind of feeling the difference is crucial.”

The F-15EX also is a fast jet. It has a top speed of over Mach 2.5. That is considerably faster than the fifth-generation fighters in

service, which travel at a maximum of Mach 1.6.

It also has unmatched payload capacity of 29,500 pounds. Boeing has added the ability to carry and deploy additional missiles from what are called Weapon Stations 1 and 9, located underwing on the far left and far right wing pylons. While the F-15E can carry eight air-to-air missiles, the EX can carry twelve. “To put that in perspective,” Heck adds, “The F-35 can hold four. So, we can serve as a missile truck, really changing a battlefield by bringing a lot of fight to the fight if you will.”

Schroeder explains that this added payload is possible because the designers decided that boosting the magazine capacity was crucial, even if it meant reducing stealth. “One advantage we have on the F-15EX is, since we are not overly worried about our radar cross section, that we’re not limited to carrying weapons in an internal bay,” says Schroeder.

“We’re not going to be the stealthy one to sneak in behind somebody,” adds Heck. “We are going to be the Mack truck bringing all the firepower with us.”

To make up for the lack of stealth, the EX is equipped with radar detection and jamming equipment to help keep it safe in highly contested environments. “We’ve got a state-of-the-art electronic warfare, a system built by BAE that is integrated into the EX. It’s called EPAWSS (Eagle Passive Active Warning Survivability System),” says Schroeder. “It allows us to get in range of enemy surface-to-air missile stations but detect where the threats are from and defend ourselves.”

THE NUMBERS LOOK GOOD

It is not just the delivery timelines and the in-air performance that has military planners excited. They are also thinking long-term and considering the potential for financial savings in sustainment and training costs.

“With the U.S. Air Force already flying F-15C models at their international guard bases, and F-15E Strike Eagles at other Air Force bases, they get to leverage existing support equipment. The training for the maintainers is also much less than if you’re starting with a new platform,” states Schroeder.

The time spent on training new air crews is also cut down tremendously, because while the powerplant has been upgraded and the payload increased, the plane’s handling characteristics are largely

The second seat in the F-15EX presents an opportunity to expand its mission profile, turning it into a platform to control uncrewed assets. (Photo by 1st Lieutenant Karissa Rodriguez, courtesy of the U.S. Air Force.)





The F-15EX takes off for its first flight from St. Louis Lambert International Airport. (Image courtesy of Boeing.)

Images top to bottom:
On April 7, the U.S. Air Force's newest fighter, the F-15EX Eagle II, was revealed and named during a ceremony held at Eglin Air Force Base in Florida. (Photo by Samuel King, Jr., courtesy of the U.S. Air Force.)

With the F-15EX, Boeing has established that it can create a highly effective modern fighter based on an affordable and proven platform. (Image courtesy of Boeing.)

Master Sergeant Tristan McIntire, 40th Flight Test Squadron, marshals the F-15EX to a stop after a test flight. (Photo by Samuel King Jr., courtesy of the U.S. Air Force.)

unchanged. “The hydraulic flow is the exact same,” says Heck. “You’re kind of going from a 1967 Corvette to a brand-new Corvette.”

This program is still in its early days. There are eight F-15EXs active today and more on the way. Lot 2, which will be comprised of twelve jets, is currently being assembled. Contracts are in place for Lots 3 through 6, which could bring the total to 104. That is great news for those balancing the books at Boeing.

Suciu agrees that the outlook for Boeing looks good. “The last block of F/A-18 Super Hornets is being built now. That will end in 2027, so Boeing really needed a big win. In addition to the F-15EX program, it’s been awarded the NGAD (Next Generation Air Dominance) contract to build the F-47. And it is one of the two companies competing for the U.S. Navy’s F/A-XX program. So yes,

Boeing is on the upswing.”

Boeing has spent more than \$2 billion on their fighter jet production facility in St. Louis, Missouri. Finnerty says that huge commitment to domestic production is partly responsible for keeping them in the good graces of those handling procurement for the U.S. Air Force. “The Pentagon is very concerned about the industrial base right now. And what that means is they want to maintain the capacity to design, build, and produce things in the United States at scale.”

One or more large orders of F-15EXs will help keep that industrial base running at full speed. At the time of this writing, Israel already signed an agreement to acquire twenty-five F-15EX jets. Indonesia, Poland, and Saudi Arabia also were looking at adding the new Eagle II to their forces in the near future.

The international interest is not surprising. Along with its reasonable price tag and rapid production process, the F-15 program boasts a perfect combat record. “The F-15’s air-to-air combat record is 104 wins to zero losses,” says Schroeder. “It’s pretty remarkable.”

That impressive record does not even take into account the work the jets did in April 2024 in the Middle East. According to Shroeder, “F-15s were used heavily in the response to the drone and cruise missile attacks from Iran to Israel. There were over seventy drone and cruise missiles in the air that F-15s scrambled and shot down. The ability to do that kind of a mission is obviously very critical for many customers.”

Currently, the U.S. Air Force views the EX as a replacement for the F-15C model as an air superiority fighter. But Heck has his own

ideas. “My personal opinion is that there’s a lot of extra capability the EX can also bring,” he says. “While the EX is considered an air-to-air superiority fighter, the aircraft has a lot of untapped potential in other mission sets that could have just as much of an impact to the overall fight.”

One proposed application is to use the second seat in the EX for a second pilot, one who would be controlling a group of unmanned fighters. Currently, the second seat is only needed in ground attack scenarios, so it often is left open in air superiority missions. But the air forces of the future will need additional pilots in theater to coordinate uncrewed assets, and the F-15EX could be their director’s chair.

WHAT’S NEXT?

With the F-15EX, Boeing has established

that it can create a highly effective modern fighter based on an affordable and proven platform. But this does not mean Boeing’s design team is abandoning the work of creating some eye-popping new planes.

“It’s not like derivatives and upgrades are the only game in town,” clarifies Schroeder. “Boeing can and will make brand-new airplanes.”

Still, the early success of the F-15EX program has both accountants and pilots excited about the possibilities. And Heck still looks back on that first magical day in the air.

“There are not many people who have gotten to fly this aircraft. And I’m super lucky to be one of the few pilots qualified on the EX. We’re all kind of awestruck with it.”



VALUED

VIPER

VARIATIONS & MORE

Why the F-16
is the Most
Widely Used
Fighter Jet in
the World

By Donna J. Kelly

You could almost say that aircraft representing the newest version of the Lockheed Martin F-16V, the Block 70/72 models, are flying off the shelves of the manufacturer's plant in Greenville, South Carolina. These latest Viper versions are headed to countries around the world such as Bahrain, Bulgaria, Jordan, Morocco, Philippines, Slovakia, South Korea, and Taiwan.

To date, twenty-six F-16Vs have been delivered to their respective countries, the first arriving in Bahrain in 2023. Slovakia's order of fourteen Block 70/72 fighters is partially fulfilled: the first two were delivered in July 2024, and the remaining aircraft are scheduled to be delivered before the end of this year. One half of Bulgaria's order of sixteen Block 70 jets were delivered to the Graf Ignatievo Air Base Bulgarian Air Force in April, and the rest are expected by 2027. Morocco is expecting the first of its fleet of Block 70/72s to be in place before 2026.

WHY DOES EVERYONE WANT THIS JET?

These advanced fighter jets effectively are a transformation of the fourth-generation aircraft into what some are referring to as a Gen 4.5 fighter. Some of the innovative features of Block 70 /72 F-16s include cutting-edge integration capabilities that allow real-time communication with other air and ground personnel.

An active electronically scanned array (AESA) radar, the newly advanced APG-83 Scalable Agile Beam Radar (SABR), manufactured by Northrop Grumman Systems of Falls Church, Virginia, enables Viper pilots to leverage hardware and software commonality with F-22 and F-35 AESA radars, increasing situational awareness of the entire area of battle. The AESA radar is also integrated with the Viper Shield AN/ALQ-254(V)1, an all-digital electronic warfare (EW) suite produced by L-3 Harris of Melbourne, Florida. The Viper Shield system provides a virtual electronic shield around the aircraft, enhancing the safety of pilots operating in complex battlespace scenarios. Upgraded weapons systems include an advanced datalink, improved targeting pod and weapons, and all-weather targeting ability.

The modernized cockpit also incorporates upgraded safety features, one of the most important being the Common Digital Flight Control Computer with an enhanced Autopilot/Auto Throttle, featuring the life-saving Automatic Ground Collision Avoidance System (Auto GCAS). Several companies, including BAE Systems of Falls Church, Virginia; Collins Aerospace of Charlotte, North Carolina; and Dassault Aviation of Paris, France, are involved in the ongoing development and integration of these systems.

Behind the Auto GCAS is an already impressive track record. According to Lockheed Martin, over the last 10 years, GCAS has saved twelve F-16 pilots from controlled flight into

terrain (CFIT), the single biggest killer of U.S. Air Force fighter pilots, accounting for up to 75 percent of all F-16 pilot fatalities. While a skilled pilot flying into the terrain seems improbable, few of us have experienced the dizzying, disorienting, often bad enough to cause unconsciousness, physical effects of pulling high G loads, while maneuvering wildly through the air at extreme speeds.

Structurally speaking, the addition of conformal fuel tanks, designed to minimize drag, vastly improves the aircraft's range to a maximum of 2,450 miles. And this being a well-built bird is evidenced by doubling of the 6,000-hour service life of earlier F-16s to 12,000 hours for the new Viper.

While many of the world's air forces are clamoring to fly the V version, the reality of the situation is that, as of May 2025, Lockheed Martin has a backlog of 114 Block 70/72 orders. The company explains that this is due to the strong demand from international partners, as well as continuing upgrades to its South Carolina facility. Since Lockheed Martin's 2017 announcement that the F-16 production line was moving to this location from Fort Worth, Texas, this plant has grown in capability and capacity. This year, it is expected to reach an output of forty-eight Block 70/72 Vipers. The facility also houses an aircraft sustainment center that provides nose-to-tail aircraft modification, maintenance, repair, and overhaul services for the F-16 Fighting Falcon.

BACK IN THE USA

Prioritizing the ongoing development of the Lockheed Martin F-35, the U.S. Air Force is currently not purchasing any Block 70/72 V models. Instead, the Air Force will continue to operate Block 40/42 and 50/52 models, which are being modernized as part of a \$6.3 billion upgrade known as the Post Block Integration Team (PoBIT). Since the Block 40/42 jets first rolled off the assembly line in 1988 and Block 50/52s were introduced in late 1991, multiple upgrades are required to keep these jets flying until the early 2040s as projected.

PoBIT is one of the largest aircraft upgrade and modification projects to date, involving a total of 608 Block 40 and Block 50 aircraft that are referred to as "Post Block" F-16s. The program is managed by the U.S. Air Force Life Cycle Management Center's Fighters and Advanced Aircraft Directorate at Wright Patterson Air Force Base in Dayton, Ohio.

"Providing this capability on an already time- and combat-proven aircraft adds another layer to U.S. Air Force capabilities in an ever-evolving electronic warfare environment," stated the then U.S. Air Force Chief of Staff General Charles Quinton (CQ) Brown, Jr., in 2023. "I know this upgrade will make us even more effective in our day-to-day combat operations, and I look forward to bringing the F-16 even further into

(Image courtesy of Lockheed Martin.)

Airman 1st Class Jacques Young of the 158th Fighter Wing inspects the turbine blades (dubbed “turkey feathers”) on an F-16 Fighting Falcon’s Pratt and Whitney F100-220E engine. (U.S. Air Force photo by Master Sergeant Rob Trubia.)



Lieutenant Colonel Stephen Graham, F-16 Electronic Warfare Test Director, completes post-flight procedures after flying an F-16 equipped with the Integrated Viper Electronic Warfare Suite (IVEWS) for the first time at Eglin Air Force Base, Florida (U.S. Air Force photo by 1st Lieutenant Rebecca Abordo.)



the future of air superiority.”

Included in the PoBIT package is the installation of the same Northrup Grumman AESA radar that the Block 70/72s V version carries. This past November, Elbit Systems of America, located in Fort Worth, Texas, was awarded a contract totaling \$89 million from the U.S. Air Force for a new avionics system called the Wide-Angle Conventional Head-Up Display (WACHUD).

The improved HUD offers a wide-angle field of operation that gives pilots more information than previously available on the older and narrower HUDs, delivering essential information to the pilot in a position that is easy to read while flying the jet and scanning the surrounding airspace. The plug-and-play system is compatible with other systems on the F-16, including the radar and targeting systems, helmet-mounted display systems, and night-vision goggles. Elbit America is performing the upgrades at its facility in Talladega, Alabama, with deliveries due through September 2027.

Elbit America Senior Vice President of Electronic Systems, Scott Tumpak, comments, “The Wide-Angle Conventional Head-Up Display replacements provide modernization, but also commonality across the U.S. Air



A Royal Bahraini Air Force (RBAF) student performs a simulated diagnostic check on an F-16 Fighting Falcon avionics system with U.S. Air Force 372nd Training Squadron (TRS) instructors at Shaw Air Force Base, South Carolina. (U.S. Air Force photo by Senior Airman Steven Cardo.)

Force’s F-16 fleet. This commonality benefits the pilots, maintainers, and supply chain, as the single configuration is easier to manage and maintain across the entire F-16 fleet.”

PoBIT Program Manager Oryan Joseph (OJ) notes that the modernization of these early model Fighting Falcons represents a huge undertaking. “Overall, the \$6.3 billion PoBIT upgrade effort includes the participation of six major commands located across more than eighteen air bases, and includes numerous companies.”

In October, an upgraded Post Block F-16 Fighting Falcon flown by Lieutenant Colonel Stephen Graham, the F-16 Electronic Warfare



Chris Kiser, an aviation engineer, works on modifying an F-16 Fighting Falcon’s wiring as part of Viper Experimentation and Next-gen Operations Model – Autonomy Flying Testbed program at Eglin Air Force Base, Florida. (U.S. Air Force photo by Samuel King Jr.)

An F-16 Fighting Falcon undergoes modifications as part of the Viper Experimentation and Next-gen Operations Model. The changes include software, hardware, and instrumentation that will enable the aircraft to fly autonomously. (U.S. Air Force photo by Samuel King Jr.)



Test Director from the 85th Test and Evaluation Squadron at Eglin Air Force Base, Florida, took off for the first time running the new Integrated Viper Electronic Warfare Suite (IVEWS). The inaugural flight testing demonstrated seamless integration.

Graham noted that the upgrade definitively increased the capabilities of the fourth generation F-16 to a Gen 4 plus. “This flight’s success reflects the dedication of everyone involved in this program. Normally, integrating a system like this would take considerable time, but the team achieved results remarkably quickly.”

FROM AERIAL TARGETS TO AUTONOMOUS DRONES

There is nothing new about using old aircraft for target drones, nor is it unusual to weaponize unmanned aerial vehicles (UAVs, another name for drones) for battle. We see and hear about them used every day in war-torn countries around the world. But those

usually are one-time use and carry only one type of weapon or warhead, meaning that they are effective but limited.

Can you imagine instead an entire weapons platform, such as an unmanned but fully operational F-16 loaded with its vast assortment of weapons, capable of flying as a Loyal Wingman besides the F-35 for example? Or even operating autonomously?

The idea of such fully autonomous aircraft has been a hot topic for some time. Key questions and concerns include: How can we be sure an autonomous fighter will operate as designed? And how do we certify that it will not be electronically commandeered and used as a weapon against our own forces? Experimentation, testing, and refining of the extension of this concept is coming from another autonomous application.

It was not unexpected when older F-16 models were transformed into aerial targets

to train pilots, starting in 2019. Contractors had had their work cut out for them as they converted Block 15, 25, and 30 aircraft into these sophisticated flying weapons platforms, nicknamed “Zombies.” Early problems included difficulty achieving cybersecurity, accomplishing remote command and control, missile trajectory, and safe flight termination. Originally, the U.S. Air Force planned for a total of twenty-five fully automized target drones, but the total has risen to ninety, with plans to fly them until 2035. The cost of each conversion has ranged between \$1 and \$2 million over the years the program has been in operation.

Other Lockheed Martin initiatives are seeking answers to the challenges of autonomous flight. One, called the “Have Raider” program, established four things that an unmanned combat air vehicle must do: (1) automatically plan a ground-attack mission, (2) execute tasks based on



These two F-16 Block 70 jets, piloted by American aviators including a member of the Indiana National Guard, landed at the Slovakian Malacky-Kuchyňa air base after a nearly 10-hour journey. (Picture source: Slovak MoD)



An F-16 Fighting Falcon assigned to the 85th Test and Evaluation Squadron taxis after flying with the Integrated Viper Electronic Warfare Suite (IVEWS) for the first time at Eglin Air Force Base, Florida. (U.S. Air Force photo by 1st Lieutenant Rebecca Abordo.)

U.S. Air Force F-16 Fighting Falcons fly in the U.S. Central Command area of responsibility. (U.S. Air Force photo by Staff Sergeant Sean Carnes.)



priorities given by the operator, (3) dynamically replan the mission to minimize exposure to the threat, and (4) demonstrate autonomous formation flying, route following, and rejoining.

THE NEXT STEP: VENOM VIPER

The last of these tasks will be particularly important when the VENOM Viper eventually flies as a “Loyal Wingman.” Loyal Wingmen are part of what the U.S. Air Force calls Collaborative Combat Aircraft (CCA), designed to be capable of accomplishing a myriad of tasks, including scouting ahead, destroying targets, conducting electronic warfare, jamming enemy signals, and much more. Loyal Wingman may even act as decoys to draw enemy fire away from a piloted airplane. These abilities can both multiply the productivity and increase the survivability of a single human pilot.

Such development efforts are part of the Viper Experimentation and Next-gen Operations Model–Autonomy Flying Testbed program, also known as the VENOM program, which is well on its way toward accomplishing its goals at Eglin Air Force Base, Florida. System integration work underway includes installation and integration of software, hardware, and other instrumentation that eventually will allow the aircraft to fly autonomously.

For example, a new auto-throttle has been added that autonomously regulates flight controls, as well as thrust. “Modifying the aircraft is the result of a rigorous design phase and brings us one step closer to testing autonomy on a fighter jet with real mission systems and capabilities,” says Major Trent McMullen, 40th Flight Test Squadron

Advanced Capabilities Division Chief.

These upgrades involve artificial intelligence (A.I.), which is always learning. The more the A.I. program runs through different scenarios, the faster it absorbs learning, literally in leaps and bounds. The software is continuously tested in faster-than-real-time modeling, in a range of simulation environments, and in countless aircraft combat scenarios. Situations include one-on-one and two-on-two, both within visual range or beyond.

“These simulations provide an efficient way to train the autonomy to learn complex air combat tactics.” McMullen explains. “A specific scenario can be run 1,000 times, and the variations and decisions made throughout that mission can be studied. We can then make recommendations to the developers on how to improve the autonomy’s behaviors and overall performance.”

System integration can be a difficult process. How well a new capability connects and communicates with the aircraft systems is paramount. On the hardware side, safety is the number one issue. The goal is to confirm that autonomous commands keep the aircraft within structural limits and will not cause it to exceed its flight envelope. For obvious reasons, this kind of testing is performed in F-16 flight simulators.

Next will be development of the capability for a human pilot to control an autonomous drone, while flying in another aircraft. And once these multiple tests are successfully completed, the VENOM program will move to ground testing with a fully modified F-16. This may happen as early as the end of 2025.

“As the VENOM program’s first flight approaches, we are excited to test novel autonomous solutions. The strides we’ve witnessed in the simulation environment suggest VENOM will help advance aerial combat capabilities for future crewed and uncrewed platforms,” McMullen concludes.

VIPERS WORLDWIDE

For more than 50 years now, the F-16 has been a truly successful fighter jet, which is why so many air forces across the globe want it in their arsenal. As both manned and unmanned versions of the aircraft continue to improve in design and function, these and future variants will help build the knowledge base for designers, engineers, pilots, and maintainers of this awesome aircraft.

New & Noteworthy Advances in Technology & the Supplier Base

By Paul McDonnold

Ogden, Utah, is the closest sizable city to the historic spot where a final golden spike was hammered into the ground in 1869, joining the first transcontinental railroad. Today, as a crossroads of the aviation defense industry, it regularly welcomes military personnel and civilian aftermarket suppliers, who gather to touch base and share updates about the latest developments at their firms and in the wider market. Stories and camaraderie often cement valuable business connections.

In compiling this publication, we contacted a number of leading companies to find out what has been happening lately at their firms. You can use this information to plan networking, as an icebreaker for chatting with industry peers, or simply to learn news about key aftermarket suppliers servicing the F-16, as well as other legacy platforms, fifth-generation airframes such as the F-35, and more.



A pilot at the controls of a U.S. Army UH-60 Black Hawk helicopter on a firefighting mission in Colorado for the Colorado Army National Guard. (Image courtesy of Wikimedia Commons.)

AEROSPACE MAINTENANCE SOLUTIONS

Headquarters: Solon, Ohio
Website: aerospacellc.com

Aerospace Maintenance Solutions (AMS) is a maintenance, repair, and overhaul provider focused on instrumentation, radar, radio communication, and other electrical and mechanical accessories, especially components that original equipment manufacturers (OEMs) have stopped supporting. For instance, in December, AMS was awarded a contract for work on U.S. Army UH-60 Black Hawks. The fixed-price contract, valued at over \$11 million, covers both overhaul and upgrade of the helicopter's control indicator, one of a group of components for which AMS is the sole approved source for repair and overhaul.

AMERICAN DATA SOLUTIONS

Headquarters: Atlanta, Georgia
Website: mddv.com

American Data Solutions (ADS), founded in Georgia in 2011 by Chief Executive Officer and Israeli Air Force Academy graduate Ran Meriaz, is a leading provider of digital solutions in the fields of technical data, publishing, maintenance, logistics, training, and scheduling. The firm serves both those in the aerospace industry and other heavy users of dynamic data, such as nuclear power providers.

Earlier this year, ADS completed a U.S. Air Force



AFWERX Small Business Innovation Research (SBIR) program Phase II contract by successfully demonstrating induction of F-16 standard generalized markup language (SGML) source data into the Modular Digital Data Viewer (MDDV) for Interactive Electronic Technical Manuals (IETM). This Small Business Technology Transfer (STTR) process addressed a pressing data management challenge faced by the Air Force.

According to Mr. Meriaz, "This program demonstrated how MDDV can enable any military program, with SGML source data, to fully utilize the capabilities of the MDDV (maintenance digital data viewer) IETM (interactive electronic technical manual) without an expensive and time-consuming conversion to S1000D. Our Class-6 IETM contributes significantly to reducing downtime, increasing aircraft availability, and ensuring the continued excellence of the F-16 fleet."

American Data Solutions Chief Executive Officer Ran Meriaz founded the company in 2011. (Image courtesy of Ran Meriaz, American Data Solutions.)

CHROMALLOY

Headquarters:
Palm Beach Gardens, Florida
Website: chromalloy.com

For more than 70 years, Chromalloy has offered aftermarket engineering, manufacturing, and service to airlines, aero-engine asset owners, and engine repair facilities. With over twenty locations worldwide, the company is a leader in Federal Aviation Administration (FAA)—certified, third-party parts manufacturer approval (PMA) and

designated engineering representative (DER) solutions.

Chromalloy recently signed a multi-year distribution and licensing agreement with the Illinois-based aerospace and defense aftermarket solutions firm AAR for high-pressure turbine blades made by Chromalloy's subsidiary BELAC for use in PW4000 engines. The contract will guarantee stock levels of the blades and, according to BELAC's General Manager Mike Zerbe, will "enhance supply chain reliability for the global aviation market."



Two workers visible through the turbine blades of a jet engine in Pratt & Whitney's Middletown Engine Center in Connecticut. (Image courtesy of Pratt & Whitney newsroom archive.)

\$80M

COLLINS AEROSPACE

Headquarters:
Charlotte, North Carolina
Website: collinsaerospace.com

A subsidiary of RTX Corporation (formerly Raytheon Technologies), Collins Aerospace delivers technologies to advance outcomes such as sustainable aviation, passenger comfort and safety, and mission success in the global aerospace and defense industry. Earlier this year, Collins was awarded an \$80 million contract to upgrade avionics on U.S. Army UH-60 Black Hawk helicopters. Featuring the company's family of Modular Open Systems Approach (MOSA)—compliant products, the upgrade is aimed at reducing life-cycle sustainment costs, while allowing for faster integration of new capabilities. Work will be done at locations in Cedar Rapids, Iowa, and Huntsville, Alabama.

CURTISS-WRIGHT

Headquarters: Davidson, North Carolina
Website: curtisswright.com

Curtiss-Wright traces its history to the earliest days of aviation through pioneers such as Glenn Curtiss and the Wright brothers. In 1942, it supplied more than 142,000 engines to the Allied war effort. Today, it is a global business with some 8,800 employees who create and provide highly engineered products, solutions, and services for aerospace and defense, as well as other industries.

In January, the company announced a \$27 million contract with Canadian Commercial Corporation (CCC) to supply aircraft handling systems and support for the U.S. Naval Air Warfare Center. This deal is part of a 5-year, indefinite delivery and quantity contract that could total near \$100 million. The work will be handled by Curtiss-Wright's EMS division in Mississauga, Ontario.

A restored Curtiss-Wright P-40 Warhawk displayed at the Mid America Flight Museum in Mount Pleasant, Texas. (Photo by Gary Todd, courtesy of Wikimedia Commons.)



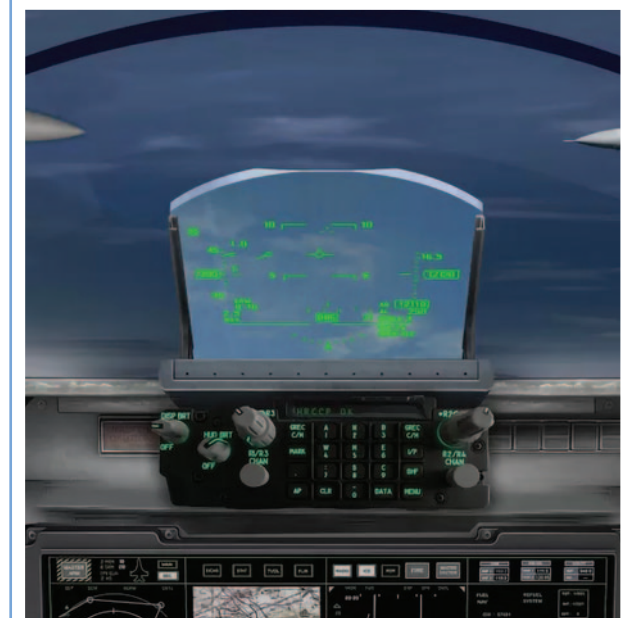
EAST/WEST INDUSTRIES

Headquarters:
Ronkonkoma, New York
Website: eastwestindustries.com

East/West Industries is a woman-owned small business based in Ronkonkoma, New York, that designs and manufactures lifesaving equipment for the aerospace industry. In August of last year, the 56-year-old firm was chosen by Bell Textron to supply troop and gunner seats for the U.S. Army's Future Long Range Assault Aircraft. Owner, Chief Executive Officer, and President Teresa Ferraro calls it "a significant milestone for East/West," adding that the seats "will play a crucial role in ensuring the protection of the aircraft's occupants so that crew and troops can conduct their duties safely and effectively."



Improved Troop Seat. (Image courtesy of East/West Industries, Inc.)



F-16 Head-Up Display (I-HUD2). (Image courtesy of Elbit Systems.)

ELBIT SYSTEMS OF AMERICA

Headquarters: Fort Worth, Texas
Website: elbitamerica.com

With over 3,300 employees across sixteen locations, Elbit Systems of America offers technological solutions to both the defense and commercial sectors. Headquartered in Fort Worth, this subsidiary of Israeli-based electronics firm Elbit Systems operates over seventy research labs and 400,000 square feet of manufacturing space. Recently, the company has been fulfilling an indefinite delivery and quantity contract with the U.S. Air Force to supply wide-angle conventional heads-up display replacements for F-16s. The work is being performed in Elbit's Talladega, Alabama, facility and will continue through September 2027.



This artist's rendering depicts the F-47 Next Generation Air Dominance (NGAD) platform, which will be powered by a Next Generation Adaptive Propulsion (NGAP) engine. (Image courtesy of U.S. Air Force Public Affairs.)

GE AEROSPACE

Headquarters: Evendale, Ohio
Website: geaerospace.com

With General Electric (GE) having split into three companies since 2021, GE Aerospace remains as the legal successor of the storied conglomerate and continues to focus on producing aircraft engines. In February, the company announced it had completed Detailed Design Review of an

adaptive cycle engine, named XA102, for the U.S. Air Force's Next Generation Adaptive Propulsion (NGAP) program. Advanced model-based systems engineering was critical to the success of the design, which clears the way for the engine's next stage of development. The design is competing with Pratt & Whitney's XA103 engine to power the Air Force's sixth-generation fighter, which is expected to eventually replace the F-22 Raptor.



HOWELL AEROSPACE AND DEFENSE

Headquarters: Fort Worth, Texas
Website: howellinst.com

Fort Worth-based Howell Instruments specializes in technology for the modernization, safety, and operational efficiency of military and commercial aircraft. In March, it announced a new order to upgrade UH-60 Black Hawk panels for PJ Helicopters as part of a broader agreement, under which additional orders of Howell's Avionics Suite may follow. The same month, Howell announced a further partnership with PJ Helicopters for an Avionics Modernization Suite for CH-47 Chinooks. PJ Helicopters' Avionics Director Derek Spooner described the all-glass panel as "a game changer, significantly improving our ability to replace outdated, hard-to-find legacy equipment."

A CH-47 Chinook helicopter carries a Royal Marine boat near Dorset, England. (Photo by Hamish Burke, courtesy of Wikimedia Commons.)



Near Fort Worth, Texas, Captain Andrew "Dojo" Olson, a member of the U.S. Air Force's F-35 Heritage Flight Team, performs a vertical climb in an F-35 Lightning II. (Photo by Airman 1st Class Alexander Cook, courtesy of Wikimedia Commons.)

ITI ENGINEERING

Headquarters: Winter Springs, Florida
Website: itiengineering.com

In April, ITI Engineering, a provider of mission-critical data transfer systems, announced a new order of \$35 million from Lockheed

Martin for delivery of Operational Data Integrated Network (ODIN) equipment, supporting this next-generation logistics and sustainment system for the F-35. The delivered equipment will include ruggedized computers and peripherals such as servers and portable data transfer devices that will replace the legacy Autonomic Logistics Information System (ALIS) equipment, improve system performance, and facilitate updates. "Through these deliveries," said ITI's President Kevin Speed "we ensure maintainers and operators have the reliable, secure, and high-performance technology required to sustain mission readiness. These systems will enhance operational efficiency, streamline maintenance, and ensure that the F-35 fleet remains fully mission-capable in any environment."

MOOG

Headquarters: Elma, New York
Website: moog.com

Moog is a global company that serves multiple industries, including defense. In February, the Federal Aviation Administration (FAA) granted Supplemental Type Certificate approval for the Genesys Avionics Suite for the

H-125, which Moog completed in partnership with the helicopter's maker Airbus. The suite includes components such as customizable primary and multi-function flight displays, a synthetic vision system, a terrain awareness and warning system, plus an autopilot. It is designed to expand the H-125's and its operators' mission capabilities in challenging meteorological environments.



A Brazilian Navy H-125 prepares for takeoff from the U.S.S. Pearl Harbor as Boatwain's Mate First Class Everett Albright looks on. (Image courtesy of Wikimedia Commons.)



NORTHROP GRUMMAN

Headquarters: Falls Church, Virginia
Website: northropgrumman.com

Global aerospace and defense firm Northrop Grumman announced in December that it had been selected to be the prime contractor for the systems integration component of the new nuclear command, control, and communications (NC3) aircraft (the Lockheed Martin E-130J) being developed to replace the Boeing E-6 in support of the U.S. Navy's Take Charge And Move Out (TACAMO) mission, which provides a communications system to keep decision makers in control of the nation's nuclear weapons arsenal in the event of nuclear war. In February, Northrop Grumman also announced implementation of a next generation upgrade of the LN-251 Inertial Navigation System/Global Positioning System for naval aircraft. This key upgrade employs a jam-resistant encrypted signal known as M-code, enabling pilots to continue operating effectively in GPS-compromised environments.



OSHKOSH AEROTECH

Headquarters: Orlando, Florida
Website: oshkosh-aerotech.com

Since acquiring Aerotech from JBT Corporation in 2023, Wisconsin-based Oshkosh Corporation has leveraged its capabilities in specialty and military vehicles, with Oshkosh Aerotech's focus on aircraft ground support equipment and maintenance systems to ensure mission readiness. This year, Ranjit Nair took over as the President of Oshkosh Aerotech, replacing Chuck Durst, who retired after more than 39 years with the company.



Francois Lacombe, Chief Executive Officer of PCI Gases. (Image courtesy of Gary Swiniarski, PCI Gases.)

PCI GASES

Headquarters: Riverside, California
Website: pcigases.com

PCI Gases provides solutions for on-site generation of oxygen and nitrogen, with production facilities in Brazil and India, as well as the United States. Last year, the firm launched a rebranding initiative to emphasize what Chief Commercial Officer Soeren Schmitz calls "our vision of providing reliable, easy-to-use, and sustainable solutions for our customers at the lowest possible cost of ownership."

By aiming to "Reshape Your Tomorrow," PCI wants to change the gas supply landscape through products such as their Self-Generating Nitrogen Servicing Cart

ROHDE & SCHWARZ

Headquarters (USA): Columbia, Maryland
Website: rohde-schwarz.com/us

Founded in 1933 and headquartered in Germany, Rohde & Schwarz has built a global reputation for developing and producing electronic equipment, particularly in the fields of test and measurement, broadcasting, secure communications, and cybersecurity, with a wide range of products across multiple industries.

Adding to its services in Germany, Rohde & Schwarz will soon be performing intermediate-level radio maintenance at its service center in Columbia, Maryland. In the meantime, it recently developed a new test system that enables F-16 customers to perform their own organizational-level maintenance on their radios. Several F-16 customers have already ordered the new system via Lockheed Martin.

The company also launched a new counter-drone

jamming capability for its ARDRONIS Effect system, which it considers part of a "strategy to help its customers dominate the electromagnetic spectrum" in military operations. As Product Manager Jan Link explains, "operators need to have the capability to jam every potential frequency, even during swarm attacks with multiple drones operating on different frequencies." To effectively disrupt even jam-resistant drones and drone swarms, the system not only broadcasts over a wide area but does so "simultaneously on multiple bands at high output power across the entire spectrum without gaps in time and frequency."



ARDRONIS Effect Automatic RC drone identification and disruption solution (Image courtesy of Rohde & Schwarz USA, Inc.)

Together ahead. **RUAG**

RUAG AG

Headquarters: Bern, Switzerland
Website: ruag.com/en

In 2024, Swiss aerospace and defense contractor Ruag received pre-approval from Armasuisse, Switzerland's Federal Office for Defense Procurement, for final assembly and testing of four of the thirty-six F-35 fighter jets being supplied by Lockheed Martin to the Swiss Air Force. While this is classified as a "technology and know-how transfer project," rather than a production project, Ruag's role as a "Material Competence Center" facilitates the company's further developing its capabilities to become a prime regional provider of F-35 maintenance and support.





PORTUGAL

and its Air Force

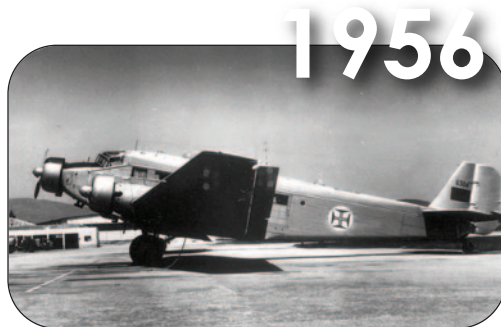
By Tracy Martin

Portugal was officially founded as a country in 1143, and over the next two centuries, Portuguese monarchs expanded the nation's borders, which have remained largely unchanged to this day. Located in southwestern Europe on the Iberian Peninsula, the Portuguese Republic is the westernmost country in continental Europe. Among the European nations, it has the longest uninterrupted border with Spain, which lies to its north and east.

Portugal rose to global prominence during the Age of Discovery from the 15th to 17th centuries, with Portuguese explorers launching voyages that combined cutting-edge scientific knowledge and seafaring skills. In 1498, Vasco da Gama successfully

navigated a sea route to India. In 1519, the Portuguese navigator, Ferdinand Magellan, led the first expedition to circumnavigate the globe. By 1523, Portuguese explorers had arrived in China, and in 1543, they reached Japan. These and other expeditions led to the establishment of a powerful maritime empire, including a vast network of settlements, trading posts, and colonies.

Skipping ahead, a pivotal moment occurred in 1908, when Portuguese King Carlos I and his heir, Prince Luís Filipe, were assassinated by members of the Republican and Carbonária movements. Just two years later, revolution ended nearly 800 years of the monarchy, and the Portuguese Republic was proclaimed.



Top to bottom:

This 1916 image shows a Farman F.40, a surveillance aircraft manufactured in France and flown by Portugal during World War I. (Image courtesy of the Portuguese Air Force.)

A Portuguese Vickers Valparaíso III Light Bomber, sometime in the 1930s. (Public Domain.)

A Junkers JU-52 aircraft, operated by the Portuguese Air Force, in Tancos, Portugal, around 1956. (Public Domain.)

An F-86F Sabre of the FAP's 51 Squadron, based at the Monte Real Air Base, in Leiria, Portugal, from 1959. (Photo by Pedro Aragao, courtesy of Creative Commons.)



A Portuguese LTV A-7 Corsair II in flight in 1984. (Photo Courtesy of the U.S. Navy National Museum.)



PORTUGUESE FAST FACTS

Capital:Lisbon
Land area:35,610 square miles
.....(92,230 square kilometers)
Religion:84.8% Christian,
.....14.1% no religion, 1.1% other
Population:10,639,726
Urban population: ...10,639,726 (2023)
Official Language:Portuguese
Literacy rate:estimated at 99.44%
Currency:Euro (€)
.....GDP \$319.934 billion (rank 47th)
Year of Independence:1128
Government:
.....Unitary semi-presidential republic
President: ...Marcelo Rebelo de Sousa
.....Prime Minister Luis Montenegro
Portuguese Armed Forces: Land and air,
.....and sea
Military Service:
.....Voluntary for men and women
Active military personnel:27,250
Reserve military personnel: ...211,700

(This information was compiled in May 2025.)

Portugal joined the Allies during World War I, but the conflict strained its fragile economy. The First Republic became marked by political instability, paving the way for a military coup that led to the rise of the Estado Novo in 1933. This authoritarian regime, headed by António de Oliveira Salazar, ruled the country for nearly five decades under a one-party system.

In World War I, aviators from Portugal conducted reconnaissance and support missions in coordination with Allied forces. At the onset of World War II, Portugal reaffirmed the 550-year-old Anglo-Portuguese Alliance that in 1373 established its agreement with England. During the conflict, the United Kingdom did not request the Portuguese peoples' involvement, so they remained neutral through most of the war. That status changed in 1944, when Portugal signed a military agreement that allowed the United States to establish a base on Terceira Island in the Azores, favoring the Allies.

Portugal has continued to play a strategic role in global affairs. A founding member of the North Atlantic Treaty Organization (NATO), the Organization for Economic Co-operation and Development (OECD), and the European Free Trade Association, it joined the United Nations (UN) in 1955. It remains active in these groups, as well as in the Council of Europe and the European Union (EU).

Portugal's global reach has left a lasting cultural impact, with over 300 million people worldwide speaking Portuguese. Today, this modern, developed country boasts a strong economy based on services, industry, and tourism.

Sergeant Pereira, the floor supervisor at Dock 4, working on cell four before test flight. (Courtesy of USAF.)

A Portuguese Air Force F-16 in Cambrai-Épinoy, France. (Photo courtesy of Aldo Bidini, GNU Free Documentation License.)



PORTUGUESE ARMED FORCES

The Portuguese Armed Forces (Forças Armadas) play a central role in safeguarding the nation’s sovereignty and are responsible for the military defense of the Republic. While the President of the Republic is the official head of the nation’s military, the forces operate under the authority of the Ministry of National Defense. Serving under the Chief of the General Staff of the Armed Forces are three main service branches: the Portuguese Navy (Marinha Portuguesa, also known as the Navio da República Portuguesa, or NRP), the Portuguese Army (Exército Português), and the Portuguese Air Force (Força Aérea Portuguesa, or FAP).

Established in 1317, the Portuguese Navy holds the distinction of being the world’s oldest continuously operating naval force. Currently, it fulfills dual missions: ensuring maritime defense through naval combat operations, and conducting coast guard duties within Portugal’s territorial waters and zones of influence. The Navy also actively participates in NATO missions, reinforcing Portugal’s international military commitments. As of 2025, the Navy includes approximately 8,200 military personnel and 620 paramilitary members, with five aircraft units and a fleet of seventy-nine vessels.

Tracing its roots back to the 12th century, the Portuguese Army is among the oldest standing armies, now made up of both career and noncommissioned officers, along with volunteer personnel. The Army is organized into several brigades and regiments that are comprised of mechanized, infantry, and artillery units to address a wide range of operational requirements. It currently maintains around 14,000 active-duty troops and a reserve force of approximately 210,000.

PORTUGUESE AIR FORCE

In 1912, Portugal began the process that would result in the creation of a military



aviation school (Escola de Aeronáutica Militar) and the Portugues Army’s Military Aeronautics Service (Serviço Aeronáutico Militar), marking the nation’s first official step into defense aviation. By 1917, the Portuguese Navy followed suit and founded the country’s first naval aviation base, which later became the Bom Sucesso Naval Air Station (Centro de Aviação Naval do Bom Sucesso) in Lisbon.

When Portugal became a founding member of NATO in 1949, the international alliance significantly influenced the development of its defense aviation capabilities. Formed in 1952, the Portuguese Air Force, or FAP, adopted a number of operational and organizational

standards from the U.S. Air Force. The creation of this independent force unified all Army aviation (Aeronáutica Militar) and Navy aviation (Aviação Naval) assets under one command.

In 1958, this aerial defense force acquired its first modern transonic jet fighters—the North American F-86F Sabre. In 1994, the FAP took delivery of its first General Dynamics F-16 fighters, and another group of F-16s was added in 1998, marking a major upgrade in Portugal’s air defense capabilities. Prior to its acquisition of the F-16, A-7P Corsair IIs had been serving both air defense and ground attack roles. The last Corsair II was retired from service in 1999.

The FAP has made steady progress in modernizing its fleet of F-16 Fighting Falcons. Since 2003, the Mid-Life Upgrade (MLU) program has enhanced the aircraft’s performance, integrating advanced avionics, upgraded radar systems, and modernized weaponry.

In April 2024, the FAP unveiled plans to replace its aging F-16s with as many as twenty-nine Lockheed Martin F-35A Lightning IIs by 2030 to align with European defense strategies. However, this March, Portugal’s Defense Minister Nuno Melo announced the cancellation of the F-35 order.

Negotiations have since been reported between Portugal and Canada regarding the possible purchase of Saab JAS 39 Gripen. In



Two Portuguese F-16s fly over Beja Air Base, Portugal. (Photo by Christian Timming, courtesy of Creative Commons.)



The Portuguese Air Force logo. (Image courtesy of the Portuguese Air Force.)

PORTUGAL’S AIR FLEET

AircraftQuantity

Combat Aircraft

F-16AM/BM Fighting Falcon28

Maritime Patrol

EADS CASA C-295 Persuader5

Lockheed P-3 Orion9

Transports

Dassault Falcon 503

Dassault Falcon 9001

EADS CASA C-2957

Embraer C-3902

Lockheed Martin C-130 Hercules4

Helicopters

AgustaWestland AW1197

AgustaWestland AW10112

Eurocopter AS3503

Sikorsky UH-603

Trainer Aircraft

Cirrus SR2212 on order

De Havilland DCH-1 Chipmunk7

Embraer A-29 Super Tucano12 on order

Socata TB 3015

Aerial Firefighting

Canadair DHC-5152 on order

Unmanned UAVs

UAVision OGASSA12

addition to talks with Canada, Portugal also is reportedly considering purchasing Eurofighter Typhoons and Dassault Rafales from the manufacturers. This change in defense decisions and reconsidering European alternatives to U.S.–made aircraft reflects Portugal’s and other nations’ concerns about the United States’s shifts in foreign policy and evolving relations with NATO.

At the time of this writing, Lisbon’s final decision on a next-generation fighter remains uncertain. With snap legislative elections scheduled for May 2025, the future of Portugal’s air combat capabilities will likely be determined by both transatlantic relations and the incoming government’s strategic priorities.



SOURCES:
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Legacy Worldwide FIGHTERS

2025

By Tracy Martin

In the pursuit of national security, the reliability of established fighter aircraft remains essential. While advanced fifth-generation fighters such as the F-35 Lightning II offer cutting-edge capabilities, their high cost and technical demands still put them out of reach for many countries.

As a result, much of the world continues to depend on fourth-generation fighters to maintain a credible military presence, deter aggression, and safeguard their airspace. Thus, still capable fighters such as the McDonnell Douglas F-4 Phantom and F-15 Eagle, Northrop F-5 Freedom Fighter, and the General Dynamics/Lockheed Martin F-16 Fighting Falcon remain vital assets. Cost-effective and combat-proven, these platforms provide reliable air

defense solutions for nations that prioritize affordability and performance.

F-4 PHANTOM

Since its introduction by McDonnell Douglas in 1960, the F-4 Phantom has made its mark in military aviation history. Serial production continued through the 1970s, with more than 100 F-4s also produced by Mitsubishi in Japan. The total production estimate is close to 5,200. Following the McDonnell Douglas merger with Boeing in 1979, the company has continued to support this legacy two-seat fighter bomber.

Originally designed as a carrier-based interceptor, the F-4 has been a cornerstone of U.S. air power, particularly during the Vietnam War, where it served prominently with both the

U.S. Navy and U.S. Marine Corps. Though its early design lacked an internal cannon, the F-4 made up for it with sheer firepower. With nine external hardpoints, it can carry up to 18,650 pounds of weapons — including air-to-air and air-to-surface missiles, and both guided and unguided nuclear munitions. Even when fully armed and weighing over 60,000 pounds at takeoff, the Phantom could reach blistering speeds of Mach 2.23, climb at over 41,000 feet per minute, and operate at altitudes up to 60,000 feet.

Modernized variants such as the F-4E Peace Icarus 2000 and F-4E Terminator 2020 continue to keep this iconic aircraft mission-ready. Its enduring service across several air forces around the world speaks to the aircraft's adaptability and robust design.

Turkey recently celebrated 50 years of service with the iconic F-4E Phantom fighter through an air show at Eskisehir featuring impressive low-altitude fly-bys. The nation's F-4Es were once expected to be replaced by the advanced F-35A stealth fighters.

However, after Turkey purchased the Russian-made S-400 missile defense system, the country was removed from the U.S.-led, F-35 Joint Strike Fighter program, leaving its Phantoms without a clear successor. While the days of these powerful jets have outlasted expectations, upgraded F-4E Terminator variants still deliver solid performance in combat scenarios and remain critical components of the country's aerial defense.

In April, aviation enthusiasts from across the world flocked to Western Greece for Iniochos 2025, the Hellenic Air Force's flagship multinational air exercise held at Andravida Air Base. This year's event brought together an impressive array of international aircraft and crews. The skies above Andravida saw a dynamic mix of capabilities: France showcased its agile Mirage 2000 fighters, India fielded the powerful Su-30s, Israel operated its high-tech G550 surveillance aircraft, and Greece proudly flew its iconic F-4E Phantom IIs.

Greece first received Phantoms in 1974 as part of the U.S.-backed "Peace Icarus"

arms program. The fighter has continued to serve Greece as a formidable platform, largely due to extensive upgrades under the Peace Icarus 2000 modernization initiative. As part of this initiative the German aerospace company DASA upgraded the fighters with state-of-the-art electronics and mission systems, giving them new relevance. Today, seventeen F-4Es fly with the Hellenic Air Force's 117 Combat Wing out of Andravida Air Base.

Iran acquired F-4 Phantom II fighters in the 1960 through 1970s, when it maintained close military and political ties with the United States. One of only three countries that still operate the F-4, it currently has an inventory of sixty-four of the fighters. Recent upgrades have included modernizing avionics, radar, and weapons systems.

F-5 FREEDOM FIGHTER/TIGER

First introduced in the 1960s, the Northrop F-5 family of lightweight, supersonic jets represented a leap forward in military aviation. Early models, such as



F-4
PHANTOM



F-5
FREEDOM FIGHTER/
TIGER



F-15
EAGLE



F-16
FIGHTING FALCON

U.S. Air Force Gen. Ronald E. Keys, the commander of Air Combat Command, and Lt. Col. J. D. Lee fly an F-4 Phantom II aircraft over the Atlantic Ocean on September 28, 2007, during the final flight of Key's military career. (U.S. Air Force photo by Staff Sgt. Samuel Rogers.)

A U.S. Navy Northrop F-5N Tiger II (BuNo 761535) attached to Fighter Squadron Composite 13 (VFC-13) "Saints" lands on Naval Air Station in Fallon, Nevada. (U.S. Navy photo by Mass Communication Specialist 1st Class Joseph R. Vincent.)

A formation of F-15C Eagles assigned to the 493rd Fighter Squadron, and an F-15E Strike Eagle assigned to the 492nd Fighter Squadron, fly over Gloucestershire, England, to attend the upcoming Royal International Air Tattoo airshow held at Royal Air Force Fairford. (U.S. Air Force photo/Senior Airman Erin Trower.)

Capt. George "Frag" Collings, an F-16 Fighting Falcon from the 8th Fighter Wing's 80th Fighter Squadron Headhunters, Kunsan Air Base, Republic of Korea, visually confirms as he rolls away after refueling from a KC-135 Stratotanker. (U.S. Air Force photo/Capt. Shannon Collins.)



Master Sgt. Joe Ray, a weapons loader assigned to the 180th Fighter Wing, Ohio Air National Guard, salutes as Capt. Justin Kreischer, an 180th FW F-16 Fighting Falcon pilot, prepares to take off for a training sortie at Kecskemet Air Base, Hungary. Approximately 150 airmen and eight F-16 fighter jets from the 180th FW traveled to the air base to participate in Load Diffuser 17, a two-week Hungarian-led multinational exercise focused on enhancing interoperability capabilities and skills among NATO allied and European partner air forces by conducting joint operations and air defenses to maintain joint readiness, while also bolstering relationships within the U.S. Air National Guard's State Partnership Program initiatives. Ohio became state partners with Hungary in 1993. (U.S. Air National Guard photo/Senior Master Sgt. Beth Holliker.)

the F-5A/B Freedom Fighter, began flying in the late 1950s, setting the stage for the improved F-5E/F Tiger II, which entered service in the early 1970s.

Initially adopted by the U.S. Navy, the F-5 quickly gained popularity among nations around the world, including the Republic of China Air Force and the Republic of Korea Air Force. Its combination of affordability, ease of maintenance, and nimble performance made it an attractive alternative to such heavier, more complex aircraft as the F-4.

During the Cold War, the United States distributed F-5s to allied nations under military assistance programs aimed at strengthening global air defenses, earning the aircraft the nickname “Freedom Fighter.” Recipient countries included Canada, Greece, Iran, Norway, South Korea, Spain, Taiwan, Thailand, and Turkey. Today, around two-thirds of these nations also operate more advanced jets, while continued use of F-5s is supported by structural life extension programs and upgraded avionics and subsystems. Northrop Grumman now offers conversion kits that transform single-seat F-5E models into two-seat F-5Fs, enhancing their utility as lead-in trainer aircraft to prepare pilots for more advanced fighter jets.

In 2025, the F-5 Tiger II continues to prove itself as a cost-effective and versatile platform, primarily serving in training and adversary roles for the U.S. Navy and U.S. Marine Corps. Through the ARTEMIS program, the U.S. Navy also is acquiring retired Swiss F-5s. Deliveries of these aircraft are scheduled to begin this year and

will support an ongoing effort to expand and modernize U.S. combat training capabilities.

Other nations, such as Brazil, continue to operate upgraded versions of the F-5 Tiger II, maintaining them in active service alongside newer fighter aircraft. The Moroccan Air Force currently operates twenty-two F-5E/F-5F, with three F-5Fs used for training. Thailand currently flies eleven F-5TH/THF Super Tigris variants.

F-15 EAGLE

The F-15 Eagle is a twin-engine, all-weather fighter jet originally developed in the United States by McDonnell Douglas, again part of Boeing since the 1997 merger. First introduced into service in 1976, the F-15 has been a key asset of the U.S. Air Force and has been exported to several allies, including Japan, Israel, and Saudi Arabia. A major upgrade came in 1989 with the introduction of the F-15E Strike Eagle, designed for long-range ground attacks.

In July 2020, the U.S. Air Force awarded Boeing an exclusive, open-ended contract to modernize the aging F-15C/D fleet and enhance F-15E models through the F-15EX program. This modernization effort is part of a broader combat strategy a Fifth-generation fighters, such as the F-22 and F-35, are expected to secure air dominance, while the upgraded F-15EX will serve as a heavily armed support aircraft, capable of delivering large quantities of weapons after the skies are cleared.

Among other deployments, F-15EX Eagle II fighter jets are expected to arrive at Selfridge Air National Guard Base in

Michigan, marking a major shift as they replace the long-serving A-10 Thunderbolt IIs that have been central to the base’s mission for over a decade.

Boeing touts the F-15EX as offering “best-in-class payload, range, and speed.” Indeed, this aircraft can carry up to 29,500 pounds of weapons. That is, nearly double the A-10’s 16,000-pound capacity, including space for four more missiles than the F-15E. In terms of speed, the F-15EX is a powerhouse, capable of reaching over Mach 2.5, or about 1,850 miles per hour, over four times faster than the A-10’s top speed. (For more on this state-of-the-art derivative, and the reasoning behind investing in an existing platform instead of a new model, see the separate feature in this issue.)

F-16 FIGHTING FALCON

The Lockheed Martin (formerly General Dynamics) F-16 Fighting Falcon remains one of the most widely used legacy fighters across the world. Originally a lightweight, daytime interceptor, the F-16 has evolved into a versatile multirole platform capable of performing air-to-air, air-to-ground, and all-weather missions with remarkable effectiveness.

The latest variant, the F-16V, known as the Viper, showcases major technological enhancements, including a large-format, high-resolution cockpit display, active electronically scanned array (AESA) radar, upgraded avionics, an efficient data bus and communications link, precision GPS navigation, an automatic ground collision avoidance system, a sniper targeting pod,

and a wide array of lethal weaponry. (For more information on the Viper, again see the separate article on this model in this issue.)

In 2021, Lockheed Martin secured a major \$14 billion contract with the U.S. Air Force on behalf of five foreign military partners. This agreement covers the production of 128 F-16V Block 70/72 aircraft, with deliveries scheduled through 2026. Production and delivery are in progress.

The F-16 Fighting Falcon marks a major upgrade from the Soviet-era aircraft currently flown by Ukraine. In April 2025, U.S. Army General Christopher Cavoli, who serves both as Supreme Allied Commander Europe and head of U.S. European Command, stated before the U.S. Senate Armed Services Committee that “Ukrainian pilots are operating F-16s every day, conducting missions against missile threats and targeting areas in eastern Russia.” Without providing exact figures, Cavoli noted that most F-16s currently flying in Ukraine were supplied by northern European allies.

The United States authorized the transfer of American F-16s to Ukraine in 2023, and the Netherlands and Denmark began delivering jets to Ukraine last summer, committing dozens of aircraft between them; these deliveries are ongoing. Norway also pledged F-16s to Ukraine, though official counts of delivered aircraft have not been publicly released. In May 2024, Belgium announced it would donate thirty surplus F-16s to Ukraine, but delivery has been postponed until the end of this year, due to delays in Belgium’s receipt of F-35 jets from the United States.

The addition of F-16s has significantly strengthened the nation’s air defense systems, improving its ability to intercept Russian cruise missiles and other aerial threats. In March, the Ukrainian Air Force published an interview with one of its F-16 pilots, revealing that more than 80 percent of missiles fired by Ukrainian F-16s had successfully hit their targets, primarily neutralizing Russia’s Shahed drones and cruise missiles launched from air, land, and sea.

Bulgaria originally placed an order for eight multi-role F-16 Block 70 aircraft in July 2019 under a \$1.3 billion deal. Deliveries were scheduled to begin in 2023, but pandemic-related delays pushed back the timeline. In 2022, Bulgaria

expanded its commitment by signing a contract with Lockheed Martin for a second batch of eight more F-16s, expected to be delivered by the end of 2027.

In April, Bulgaria received the first of its sixteen F-16s, a major step in modernizing its air force to meet NATO standards. Prime Minister Rosen Zhelyazkov emphasized the significance of the delivery, calling the F-16 “Not just a fighter jet, but a symbol and embodiment of Bulgaria’s strategic partnership with the United States, a partnership that offers a new perspective for the Bulgarian Army.”

This spring, the United States approved the potential sale of twenty F-16 fighter jets to the Philippines. The U.S. Defense Security Cooperation Agency (DSCA) announced the proposed sale, valued at approximately \$5.58 billion, which includes the F-16 Block 70/72 aircraft and related equipment. In addition to increasing the air capabilities of this key U.S. ally in the Indo-Pacific region, the updated fourth-generation fighter’s structural service life exceeding 12,000 flight hours also supports mission readiness.

The Philippines finds itself on the front lines of growing tensions with China, which continues to assert expansive territorial claims over the South China Sea, despite an international tribunal ruling rejecting Beijing’s claims. In this volatile environment, steps to strengthen its forces, along with the U.S. military presence in the region, are viewed by allies as crucial to counterbalancing China’s expanding military power and a resurgent, Russia-aligned North Korea.



SOURCES

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Following is a list of key legacy fighter aircraft in worldwide fleets at the time of this writing.

MCDONNELL DOUGLAS F-4 PHANTOM

Greece	Hellenic Air Force	17
Iran	Islamic Republic of Iran Air Force	64
Turkey	Turkish Air Force	19

NORTHROP F-5 FREEDOM FIGHTER/TIGER

Brazil	Brazilian Air Force	42
Chile	Chilean Air Force	13
Honduras	Honduran Air Force	4
Iran	Islamic Republic of Iran Air Force	35
Kenya	Kenya Air Force	23
Mexico	Mexican Air Force	8
Morocco	Royal Moroccan Air Force	22
South Korea	Republic of Korea Air Force	61
Switzerland	Swiss Air Force	18
Thailand	Royal Thai Air Force	13
Tunisia	Tunisian Air Force	10
Yemen	Yemen Arab Republic Air Force	11

MCDONNELL DOUGLAS/BOEING F-15 EAGLES

Israel	Israel Air and Space Force	66 (25 on order)
Japan	Japan Air Self-Defense Force	199
Qatar	Qatar Emiri Air Force	37
Saudi Arabia	Royal Saudi Air Force	231
Singapore	Republic of Singapore Air Force	40
South Korea	Republic of Korea Air Force	59
U.S.A.	United States Air Force	371

GENERAL DYNAMICS–LOCKHEED MARTIN F-16 FIGHTING FALCON

Bahrain	Royal Bahraini Air Force	24
Belgium	Belgian Air Component	45
Bulgaria	Bulgarian Air Force	1 (15 on order)
Chile	Chilean Air Force	46
Denmark	Royal Danish Air Force	31
Egypt	Egyptian Air Force	168
Greece	Hellenic Air Force	152
Indonesia	Indonesian Air Force	33
Israel	Israel Air and Space Force	174
Jordan	Royal Jordanian Air Force	53 (16 on order)
Morocco	Royal Moroccan Air Force	23
Oman	Royal Air Force of Oman	23
Pakistan	Pakistan Air Force	75
Poland	Polish Air Force	48
Portugal	Portuguese Air Force	28
Romania	Romanian Air Force	33
Singapore	Republic of Singapore Air Force	59
Slovakia	Slovak Air Force	3 (11 on order)
South Korea	Republic of Korea Air Force	167
Taiwan	Republic of China Air Force	140
Thailand	Royal Thai Air Force	48
Turkey	Turkish Air Force	234
UAE	United Arab Emirates Air Force	76
U.S.A.	United States Air Force	726
Venezuela	Venezuelan Military Aviation	3

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The companies listed on the following pages are suppliers of parts, components, systems and repairs for the fighter aircraft aftermarket. Firms indicated in **BOLD** type with their logo and description have been vetted by the publishers as bona-fide sources of supply and are the best in the business, providing quality equipment and services at a price that reflects true value for the purchaser. We suggest you contact these businesses for all your supply and repair needs, since they are dedicated to your satisfaction as customers. If they do not have the exact part or repair you require, they can act on your behalf to locate a solution for you. For more information please contact Richard Greenwald at r.greenwald@abdonline.com.

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A Turkish Air Force F-16 Fighting Falcon participating in a joint U.S.–Turkey exercise at Nellis Air Force Base in Nevada in 2016. The F-16 foreign military sales acquisition arrangement between the United States and Turkey is officially known as the Peace Onyx program. (Image courtesy of the U.S. Air Force.)

By Patrick J. Walsh

Given the ever-evolving lethality of its weapons systems and its long record of combat service, the Lockheed Martin F-16 Fighting Falcon has long held a coveted spot in the arsenal of the U.S. Air Force and allied air forces around the globe. The F-16 is prized for its offensive capabilities. However, virtually every acquisition of the F-16 by a foreign nation, as is the case with most American military aircraft sold through the U.S. foreign military sales program, begins with a nod toward keeping the peace. In fact, the custom of including the word “peace” as a prefix for programs involving export sales of military aircraft has a long history.

In the case of the Fighting Falcon, for example, when the Israeli Air Force (IAF) acquired its first F-16s in 1980, the sale was the first phase of a U.S.-Israeli foreign military sales agreement known as “Peace Marble I.” In subsequent phases of the Peace Marble arrangement, Israel continued to acquire F-16s into the twenty-first century.

Similarly, when Greece began its multi-phase F-16 acquisition arrangement with the U.S. Department of Defense in 1989, it was christened “Peace Xenia.” This program enabled the Greek Hellenic Air Force to purchase its fleet of 170 F-16s over the span of more than two decades.

Some other notable examples of the “peace” naming convention for F-16 acquisitions include the programs of Egypt (Peace Vector, 1982); Turkey (Peace Onyx, 1983); Bahrain (Peace Crown, 1987); Jordan (Peace Falcon, 1994); Portugal (Peace Atlantis, 1994); and Poland (Peace Sky, 2003).

Sources: Luke Diaz, “A Complete Guide To The Lockheed Martin F-16’s Variants & The Countries That Fly Them,” Simple Flying, October 10, 2024, [simpleflying.com](https://simpleflying.com/f-16-users/); “F-16 Users: F-16 Air forces, operators, and potential customers,” f-16.net; “F-16V (Viper) Fighting Falcon Multi-Role Fighter,” Air Force Technology, March 22, 2024, airforce-technology.com; Peter Felstead, “Israel Air Force retires its fleet of F-16C Barak 1 fighters,” European Security & Defense, July 17, 2024, euro-sd.com; “Lockheed Martin Receives Contract to Start Upgrade Program for Turkey’s F-16s,” Lockheed Martin press release, July 20, 2005, lockheedmartin.com; J. Kasper Oestergaard, “Greece Contemplates F-35 Acquisition to Replace Oldest F-16s,” Forecast International, April 17, 2019, dsm.forecastinternational.com.

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Lockheed Martin has had a production facility in Greenville, South Carolina, since 1984, and moved production of the F-16 Fighting Falcon to the Greenville location in 2017. To honor the 50th anniversary of the F-16, the state declared January 30, 2024 “F-16 Fighting Falcon Day.” Pictured (left to right) are Murrell Smith, Speaker, House of Representatives, South Carolina; Trish Pagan, Vice President, F-16 Program & Greenville Site Lead; Henry McMaster, Governor, South Carolina; Pamela Evette, Lieutenant Governor, South Carolina; Sara Hazzard, President and CEO, South Carolina Manufacturers Alliance; and Thomas Alexander, President, South Carolina Senate. (Image courtesy of Lockheed Martin.)

By Patrick J. Walsh

The Lockheed Martin F-16 Fighting Falcon was born in Texas. But more recently, it found a warm welcome in Greenville, South Carolina.

Lockheed Martin began its operations in Greenville in 1984. In 2017, the company decided to move production of the Fighting Falcon from its Fort Worth, Texas, location—where 3,620 F-16s had been built since the airframe’s inception in the early 1970s—to the South Carolina facility. The move was necessitated by the growing production demands of the company’s F-35 Lightning II, which is manufactured at the Fort Worth plant.

If there was any doubt about residents of the Palmetto State favoring becoming the “Global Home of the F-16,” the results of an online contest conducted by the South Carolina Manufacturers Alliance (SCMA) in 2022 definitively resolved the question in the Viper’s favor.

In 2023, the same year that the first F-16 made at the South Carolina plant was delivered, the second annual SCMA “SC Manufacturing Madness” contest attracted more than 220,000 votes over the course of two months, resulting in the F-16 being named that year’s “Coolest Thing Made in South Carolina.” This honor was followed by the declaration of January 30, 2024, as “F-16 Fighting Falcon Day” by the South Carolina State Senate and House of Representatives to celebrate the F-16’s 50th anniversary.

Lockheed Martin currently employs about 2,000 at its facility in the South Carolina Technology and Aviation Center industrial park, located on the grounds of the former Donaldson Air Force Base.

Sources: Max B. Baker, “How the F-16 fighter jet put Fort Worth on the aerospace map,” *Fort Worth Star-Telegram*, November 25, 2017, star-telegram.com; David Dykes, “Lockheed Martin Delivers First Block 70 F-16 Aircraft to Bulgaria,” *Greenville Business Magazine*, January 31, 2025, greenvillebusinessmag.com; “F-16 Fighting Falcon Voted ‘Coolest Thing Made in SC,’” South Carolina Manufacturers Alliance press release, March 29, 2023, myscma.com; “Lockheed Martin’s Greenville, SC Site: For 40 years Lockheed Martin has called South Carolina home,” Lockheed Martin press release lockheedmartin.com; “State of South Carolina Declares Jan. 30 F-16 Fighting Falcon Day,” Lockheed Martin press release, January 30, 2024, lockheedmartin.com.

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U.S. Air Force Captain Robert M. White in the cockpit of a North American Aviation X-15 at Edwards Air Force Base in California. In 1956, White made the first flight test of a side stick controller, which later became a distinguishing feature of the Lockheed Martin F-16 Fighting Falcon. (Image courtesy of the U.S. Air Force.)

By Patrick J. Walsh

Of all the innovations that have helped to define popular perceptions of the Lockheed Martin F-16 Fighting Falcon over the years, there is one in particular that has literally touched the day-to-day lives of F-16 pilots: the side stick controller. This vital part has contributed as much to the fighter jet’s legend as its Viper nickname and iconic bubble canopy.

For those whose first look into the Viper cockpit was via a video game and joystick, it may come as a surprise to learn that the first flight test of a side stick controller dates back to August 11, 1956, more than two decades prior to the introduction of the F-16. On that date, U.S. Air Force Captain Robert M. White tested a side stick for the first time, while piloting a Convair F-102A Delta Dagger interceptor aircraft at Edwards Air Force Base in California.

The F-102A’s side stick test was actually developed for the new Convair F-106 Delta Dart interceptor, which would feature an innovative radar display system that benefited from moving the controller to one side of the cockpit. The F-106 entered U.S. Air Force service in 1959; the last of the type was retired in 1988.

A combat veteran of World War II, the Korean War, and later, the Vietnam War, White was also a renowned test pilot. He was the first human being to fly at Mach 4, Mach 5, and Mach 6 — four, five, and six times the speed of sound. He retired from the U.S. Air Force in 1981, with the rank of Major General.

Sources: “August 11, 1956: F-102 Side Stick Testing,” U.S. Air Force press release, August 11, 2020. usaf.mil; Biography: Major General Robert M. White. usaf.mil.

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