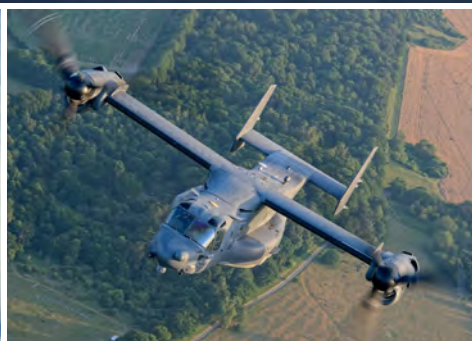


# UNITED STATES AIR FORCE

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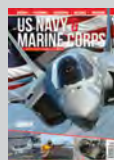
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A B-2A Spirit from the  
509th Bomb Wing at  
Whiteman AFB. **USAF/**  
**SSgt Bennie J. Davis III**

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# UNITED STATES AIR FORCE AIR POWER YEARBOOK 2016



WELCOME TO THE inaugural edition of the US Air Force Air Power Yearbook. This annual publication provides a round-up of some of the most important activities from within the ranks of the world's premier air arm.

The USAF boasts the most potent fighter aircraft, the largest air transport fleet, more tankers than the combined fleets of the rest of the world — the superlatives go on and on. However, having such a large force structure in turbulent financial times means it is an organization under pressure. The requirement to cut costs, to do more with less, and to get smart with

procurement and through-life running costs is unprecedented. The air force is a shadow of its former self when comparing overall 'mass' with a quarter of a century ago, but the cost of equipping its squadrons continues to rise.

As we went to press, US Secretary of Defense Ash Carter had just announced the selection of Northrop Grumman to build the air force's new bomber. Meanwhile, the USAF strives to reduce its overheads, but politics has hamstrung many of its plans. The USAF leadership decided that the entire A-10 Thunderbolt II close air support aircraft fleet could be axed. Lawmakers are still thwarting this

move. An important upgrade for the ageing 'legacy' C-130 Hercules fleet has been on and off the table for the past five years. The project remains stillborn.

These are just a handful of the many challenges that face USAF leaders on a daily basis, some of which we will review in this Yearbook.

**Jamie Hunter**, Editor

E-mail: [jamie.hunter@keypublishing.com](mailto:jamie.hunter@keypublishing.com)

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Imagination at work.







In 2016 the USAF hopes to see initial operating capability (IOC) for the F-35A Lightning II.  
**Jamie Hunter**

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F-4G "Wild Weasel"  
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F-117A Nighthawk  
F-16C Fighting Falcon  
KC-135R Stratotanker

B-1B Lancer  
C-27A Spartan  
VC-25A Air Force One  
HH/MH-60G Pave Hawk  
B-2A Spirit  
U-2S Dragon Lady  
RC-135W Rivet Joint  
YAL-1 Airborne Laser  
C-40B Clipper  
C-5M Super Galaxy

*\*Developed by GE, manufactured by Allison*



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# UNITED STATES AIR FORCE TODAY

The United States Air Force is the most formidable air and space military service in the world. It's the only air arm able to deploy fighters, deliver munitions and haul cargo to any point on the globe.

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**report:** Robert F. Dorr







The ultimate symbol of US Air Force air power — the mighty B-52H Stratofortress will remain in service for the foreseeable future.

**Frank Crébas/  
Bluelife  
Aviation**

Gen Mark Welsh III is the US Air Force's 20th Chief of Staff.  
**USAF**

**T**HE UNITED STATES Air Force has 348,953 active-duty, 105,658 Air National Guard and 118,979 Reserve airmen, plus 166,732 civilian workers. It has 5,433 aircraft. Air Force Secretary Deborah Lee James and chief of staff Gen Mark Welsh are doing a good job. They're defending programs effectively on Capitol Hill, they're helping to engineer an air campaign in the Middle East, they're working diligently on pay, benefits, force-shaping and other personnel issues. While they lack the mutual chemistry that often enhances a partnership, James and Welsh are making progress after a painful decade (2005-15) when aircraft programs foundered and recapitalization had to be set aside.

The challenges are staggering.

## AN AIR FORCE AT WAR

To start with, everyone is exhausted.

Right in the midst of the air campaign against the so-called Islamic State (IS), also

known as ISIS, President Barack Obama announced October 15 that the US will send 300 military personnel to the West African nation of Cameroon to help in the regional fight against the extremist group Boko Haram. This will further challenge air mobility forces — tankers and transports — that are already stretched thin supporting a US military presence in countries as disparate as Yemen and South Korea.

The strategic airlift fleet of C-17A Globemaster III, C-5A/B Galaxy and C-5M Super Galaxy cargo haulers is younger than other Air Force components, but worldwide commitments are pushing it hard. The C-5M is a modest and little-noticed success story.

Going back a quarter of a century, to the 'Desert Shield' build-up of 1990, the Air Force has been on a constant wartime footing since before some of today's youngest airmen were born. In some career fields — the all-important

Joint Terminal Attack Controllers (JTACs) stand out — there is almost never any relief from constant deployments and the trauma of war.

The campaign against IS, begun on August 8, 2014 and retroactively dubbed Operation 'Inherent Resolve', is tying up Air Force people and resources — especially tankers — but is satisfying neither supporters nor critics. The air campaign has destroyed 10,700 targets, according to an Air Force press release. That total, however, includes a target as small as an armed pick-up truck, known as a 'technical' in jargon, which probably cost less than the bomb dropped on it. The strikes are eroding IS leadership, according to officials. Indeed, some key IS leaders have been killed. But reports that leader Abu Bakr al-Baghdadi was wounded in an air strike in October do not seem to be credible.

As of October 2015, the US and partner nations had conducted 7,323 sorties





Six F-16Cs operated by the 31st Fighter Wing deployed from Aviano to Incirlik following Turkey's decision to host the deployment of US aircraft conducting counter-IS operations. **USAF/A1C Deana Heitzman**

against IS, 4,701 in Iraq and 2,622 in Syria (a sortie being a flight by a single aircraft). That averages about 20 sorties per day compared to 1,230 daily during the Gulf War of 1991, Operation 'Desert Storm'. More frustrating than the small numbers are rules of engagement so restrictive that many aircraft are bringing back ordnance rather than dispensing it. Carrier-based US Navy aircraft are flying the bulk of the strikes, which are a significant drain on the Air Force's KC-135 Stratotanker resources. F-22 Raptors, flying top cover and sometimes dropping bombs, have proven their worth during a sustained effort.

'Is the Pentagon using air power to its full potential?' asked the trade journal *Defense News* on October 12. The answer probably depends upon how many civilian casualties one wishes to incur against a foe that hides in urban shops and homes. Many Air Force officers feel that, despite the reduced size of the Air Force itself, the campaign needs to deliver more ordnance to more places if it is to achieve the administration's goal to 'degrade and destroy' IS. Some Americans and some in Washington hold a contrary view: they say fighting between Sunnis and Shiites in the region will continue in some form and that the United States has nothing to gain by intervening.

## PENTAGON PLANNING

Near the purple water fountain in the basement of the Pentagon, a familiar

SrA Clarissa Banks, a 340th Aircraft Maintenance Unit crew chief, controls the movement of a KC-135R Stratotanker prior to take-off from Al Udeid Air Base, Qatar. **USAF/SrA James Richardson**



Boeing 767-2C N461FT during its first test flight with air refueling boom and wing pods installed on June 2, 2015. **Boeing/John D. Parker**



The A-10C Thunderbolt II's future hangs in the balance, as the USAF tries to end its career but lawmakers try to preserve the close air support mission for the 'Hawg'.

**Jamie Hunter**

landmark to anyone who ever served on the Air Staff, officials are seriously debating two options vis-à-vis IS. United States forces, they are saying, must make a choice: to 'go big' or 'go home'.

At the end of the day, that's policy, not a decision for those in uniform. And policy is being shaped with very little public input. It is noteworthy that the air campaign against IS has received almost no attention from major candidates in either political party in the run-up to the 2016 Presidential election.

Apart from the pressures of war, the Air Force must contend with politics in Washington. The Air Force is relatively efficient but much of government is not. Air Staff planning is hampered by the chronic failure of Congress, year after year, to perform its basic function of enacting a budget.

Action officers — the term for those in the Pentagon who put programs together — find it impossible to project the future because at any given time they cannot know how much money will be appropriated. The dysfunctional fiscal process is having an impact on all of the aircraft programs in the news — the F-35A Lightning II Joint Strike Fighter, the KC-46A Pegasus air refueling tanker, the Long-Range Strike — Bomber, and the T-X trainer effort aimed at replacing the T-38C Talon.

## MISSED CHANCES

The Air Force is down, now, to almost half its strength during 'Desert Storm' in 1991 and, as noted above, there has passed before us a golden decade — 2005 to 2015 — in which the aircraft inventory was supposed to be modernized and wasn't. Plans called for a new bomber, tanker, and combat rescue helicopter as well as a formidable fighting force of 381 F-22 Raptor stealth fighters providing high cover for F-35 multi-purpose jets.

Gen T. Michael Moseley, who became chief of staff in 2005, said that year that he anticipated that by 2015 the new bomber would be in flight test, the first squadrons of new tankers would be on

the ramp, a new combat rescue helicopter would be entering service, and the entire Air Force would be doing its job protected by an adequate combat air patrol of F-22 super-fighters.

Not one of those plans has materialized.

Much of the blame — or credit, to those who say he was right — belongs to Robert Gates, Defense Secretary from 2006 to 2011 and who assigned first priority to tools and weapons that would fit counter-insurgency operations in Iraq and Afghanistan. Gates was fond of small-war systems like the C-27J Spartan tactical airlifter and MC-12W Project Liberty surveillance version of the Beechcraft King Air. Like the mine-resistant vehicles known as MRAPs issued at Gates' behest to the Army and Marine Corps, the C-27J and MC-12W have enjoyed a short period of usefulness in a limited conflict and are now gone from the scene, or on their way out. Much of the equipment Gates preferred for brushfire conflicts, MRAPs in particular, is now being used to good purpose by IS.

Gates killed the F-22, leaving a force of 187 aircraft — about 150 operational at any time — that has overcome vicissitudes to perform brilliantly but is too small to fit either force-structure needs or real-world threats.

The F-35 is being developed more slowly, at greater cost, and with more



Cruising above the spectacular northern California landscape, the graceful U-2S is a challenging aircraft to fly in many respects. The training course is tough and the community is tight-knit, with the type likely to stay operational until at least 2019. **Lockheed Martin**





technical glitches than once anticipated. Opinions on the capability of the F-35 vary, but the Lightning II is not the panacea that can readily take on all the duties of the A-10 Thunderbolt II, F-15 Eagle, and F-16 Fighting Falcon. The future of these older warplanes, especially the A-10, is caught up in ongoing debate in Washington.

## FIGHTERS AND BOMBERS

As an air-to-air fighter, the F-35 was always intended to be a 'little brother' to the F-22. But proponents say its stealth, sensors and sensor fusion will enable the F-35 to prevail. 'We're never going to be on the defensive in the merge', an F-35 pilot told the Yearbook, referring to a hypothetical, close-quarters battle with the Sukhoi Su-35. Col David Lyons, commander of the 388th Fighter Wing at Hill Air Force Base, Utah, told reporters October 14 that the first F-35s in an operational unit are flying 'basic surface attack, air-to-air intercepts, opposed surface attack, and light suppression of enemy air defenses.'

Lyons said, 'the airplanes have met all our expectations in the air', and, 'We have not lost a single flight to a mechanical problem'. Hill was designated the first operational base for the F-35 in December 2013, and is expected to declare initial operational capability next August. Officials say that a widely circulated internet report about earlier-generation fighters defeating the F-35 in a mock dogfight is misleading and is based on inaccurate calculations.

In preparing this introduction to today's Air Force, the Yearbook came upon conflicting information about the cannon on the F-35, considered especially important for air-to-ground work. Air Force officials say the gun is not yet certified for use on the F-35 and may not be until 2019 — and it is not mounted on aircraft at Hill. However, a well-placed source also said that the gun is 'coming along just fine' and will be fully operational much sooner.

The current bomber force is down to a mere 158 airframes (75 B-52 Stratofortresses, 60 B-1B Lancers and 19

B-2 Spirits). Mission-capable rates are low — routinely below 50 per cent, meaning that less than half of planned missions get flown — and only about half of the fleet is battle-ready at any given moment.

## LONG-RANGE STRIKE

The selection of Northrop Grumman to develop the Long-Range Strike — Bomber, was announced on October 27, but years could elapse before iron is on the ramp. The Air Force plans to acquire 80 to 100 LRS-Bs for a price of \$550 million per aircraft in 2010 dollars.

LRS-B will be manned (with an option for an unmanned version to become available later) and will carry more conventional and nuclear weapons. It will be a stealth aircraft, optimized for survival in the face of the most advanced air defense systems.

The KC-46A Pegasus is now flying, the first fully equipped aircraft (and second in the series) having taken to the skies last September 25. Under flight rules at press time, the KC-46A was flying with its refueling boom in the stowed position. It may be months before a KC-46A transfers fuel to a receiver aircraft in flight. Because of Congressional funding uncertainty, it's doubtful Boeing can honor its contractual obligation to deliver eight KC-46As in Fiscal Year (FY) 2016.

A helicopter for combat search and rescue forces didn't materialize in the way Air Force leaders once hoped.

**Above:** Check six! An F-16 Fighting Falcon pilot looks back for his pursuer during a dogfight. **USAF**

**Right top to bottom:** The US Air Force's new Long-Range Strike — Bomber (LRS-B) will be built by Northrop Grumman, according to a statement issued on October 27. **Northrop Grumman**

Gen Herbert 'Hawk' Carlisle, the commander of Air Combat Command, during the hand-over ceremony for the initial F-35A to the 388th FW at Hill AFB, the USAF's first operational Lightning II wing. **USAF**

F-35A training is spinning up at a pace at both Eglin and Luke AFBs.

**Jim Haseltine**

*'Gates killed the F-22, leaving a force of 187 aircraft — about 150 operational at any time — that has overcome vicissitudes to perform brilliantly but is too small to fit either force-structure needs or real-world threats'*





Washington political in-fighting quickly reversed a 2006 source selection of the Boeing HH-47 Chinook. The current program under which Sikorsky may build as many as 112 examples of the CRH-60, a version of the UH-60M Black Hawk, gives rescue crews only a small improvement over the earlier derivative of the Black Hawk family, the long-serving HH-60G Pave Hawk.

The T-X program began in 2011 as a straightforward effort to replace the T-38C Talon, probably with an existing aircraft type. As Air Staff officers waited, year after year, for funding for T-X, they made their requirements for a new aircraft more intricate. A March 2015 request for information from industry includes sustained g-force requirements that appear to disqualify the Alenia Aermacchi M-346 and the BAE Systems Hawk, a year after a pair of Hawks went on a demonstration tour of US training bases. One expert said T-X is 'over-spec'd', meaning that program officials are laying on too many requirements that may prove difficult to fulfill. If Congress resolves the FY 2016 defense bill, funds will become available for T-X construction and a fly-off competition.

No, the US Air Force doesn't have every combat aircraft it once hoped to have at this juncture, but progress is real, prowess is undeniable, and American airmen are ready to handle whatever job their elected leaders give them. 🇺🇸







**W**HEN THE US military started air strikes against Islamic State (IS) targets in Iraq on August 8, 2014, the US Air Force was low-key regarding its initial involvement. Most media coverage surrounded US Navy F/A-18 operations from the USS *George H. W. Bush* (CVN-77) in the Persian Gulf. However, it was clear that the Air Force was in the region and participating to a significant degree.

The quiet approach changed on the night of September 22 as the US and key Arab nation allies struck at the heart of the Islamic State, or ISIL (Islamic State of Iraq and the Levant) as it is also known, by attacking targets in its stronghold in Ar Raqqa province, Syria. The following day, the Pentagon's press secretary RADM John Kirby announced: 'I can confirm that US military and partner nation forces are undertaking military action against ISIL terrorists in Syria using a mix of fighter, bomber and Tomahawk land attack missiles.' It was also confirmed that F-22 Raptors had taken part in the second wave of the strikes on targets in Syria on that first night, during the early hours of September 23.

This was a significant announcement as it marked the first time the US Air Force's super-fighter had seen combat action.

As further details emerged, it became clear that a flight of Raptors assigned to the 1st Fighter Wing at JB Langley-Eustis, deployed to the Arabian Gulf region, were used to strike an IS command and control center in Ar Raqqa. The Joint Staff director of operations, Army Lt Gen William Mayville, said that the F-22s used GPS-guided munitions to target the facility, which was located in northern Syria about 75 miles from the Turkish border. Pre- and post-strike imagery of the target was displayed, illustrating how the Raptors had only targeted one end of the building with extreme precision. Interestingly, Mayville said that US Central Command's combined air and space operations center (CAOC) chose the platforms used in the attack based on 'what was available in the region.'

Beyond that, information on the use of the Raptors in Operation 'Inherent Resolve' have remained scarce. It is known that the F-22s maintain an almost constant deployed presence with the 380th Air Expeditionary Wing at Al Dhafra in the United Arab Emirates, and that the aircraft have been active in the ongoing air campaign, but there have been no more reports of them having struck targets. However, the US Air Force says that the F-22s are still flying

F-22 Raptors have had a busy year, being deployed both to the Central Command area of responsibility (AOR) and to Europe. **USAF/TSgt Jason Robertson**





# RAPTOR ON THE FRONT LINE

In September 2014, the F-22 Raptor made its combat debut in the skies over Syria. It continued combat operations into 2015, and undertook an inaugural training deployment to Europe.

---

**report:** Jamie Hunter





**Left:** An F-22 pilot from the 1st FW goes through pre-flight checks. **USAF/SSgt Antoinette Gibson**



over Syria, and while they have not dropped weapons again they are still playing an important role. Part of that role may relate to monitoring the entire battlespace and helping to ensure that any Syrian fighters remain on the ground, as they have done so far.

Former Raptor pilot Maj Gen Jeffrey Harrigan, the deputy chief of staff for operations, plans and requirements, told reporters back in 2014: 'Planners are taking a look at the specifics of each mission and determining if they need them [the Raptors] or not. So it will depend on what the targets are, where they are, and the environment — whether it's day, night, those kind of things — to determine if it is necessary to flow the F-22 into the package'. It appears that the Raptors are not flying Syria missions every day, but the jet's suite of advanced avionics certainly appear to be lending a vital hand in the intelligence, surveillance and reconnaissance (ISR) operations that are ongoing.

'The greatest capability the F-22 brings is its integrated avionics, its fused avionics that facilitates situational awareness not just for the pilot in the airplane but really for the entire package that is going to execute the mission,' comments Harrigan. Its electronic warfare prowess for strike packages is also likely to be significant, including its impressive combat identification techniques. 'If you look at the packages that have been put

**Left:** An F-22 Raptor tops up its tanks from a KC-10 en route to Syria during a mission on September 26, as part of a strike package engaging IS targets. **USAF/TSgt Russ Scalf**



together, there have been electronic warfare assets as part of the packages. It kind of depends on what targets they are going after and where those targets are located,' he said.

Syria's air defenses have remained 'passive'. President al-Assad knows it would be foolhardy to resist the coalition forces. That first night, the Raptors are likely to have been used for a number of reasons. Firstly, they were an asset that was in theater and available. Secondly, if any Syrian fighters had got airborne, the Raptors would have swiftly dealt them a killer blow using their undoubted air superiority prowess to take them out with ease. Thirdly, the F-22's impressive stealth characteristics would have allowed the aircraft to penetrate an area where there may have been initial concerns over SAM threats. But, most importantly, it was about time the Raptors started earning their operational spurs.

**This image:** F-22s from the 1st FW return from their first missions into Syria in September 2014. **USAF/TSgt Russ Scalf**

**Inset:** Pre- and post-strike imagery of a Raptor's target from the first strikes in Syria. **US DoD**

## FIRST MISSION

Lt Gen Mayville's initial statement shed a little light on the actual Raptor mission over Syria. He said that the F-22s flew alongside F-15Es, F-16s and F/A-18s, as well as B-1B bombers. He added that unidentified 'drones' and Tomahawk land attack missiles (TLAMs) were used. The first wave of strikes saw the employment of TLAMs to strike IS targets in the vicinity of Aleppo, Syria. The second wave,



including the F-22s, hit IS headquarters, training camps, barracks, and combat vehicles. Mayville declined to release the exact number of F-22s involved in the strikes.

Central Command (CENTCOM) spokesman Lt Col Edward Sholtis said that the three waves of attacks saw US and coalition forces attacking 22 targets with roughly 200 munitions. Sholtis declined to comment on the actual weapon used by the F-22s, but they are capable of employing either the 1,000lb GBU-32 Joint Direct Attack Munition (JDAM) or the 250lb GBU-39 Small Diameter Bomb (SDB). One report claimed that the former was used by the Raptors on that first night, another that only a single Raptor actually dropped weapons, although neither can be corroborated.

Ironically, the Raptor, developed for the most hotly-contested of theaters, appears to have cut its combat teeth in the most benign of environments. It wasn't kicking down the door in a night-one LO (low-observable) offensive in a highly-contested environment, it wasn't engaging 'Flankers' stealthily — it was most likely joining the ranks of the strike package as an insurance policy against a possible SAM threat or to be at the ready to whack any marauding Syrian fighters. One thing we have learned from reporting on types such as the F-22 is that we can never fully appreciate its full suite of capabilities, because that's classified. What we do know is that, this time, it appears that neither the SAMs nor the fighters came, so the Raptor had to make do with its combat debut being a pinpoint strike.







## INTO EUROPE

The US Air Force deployed Raptors for the type's first formal training deployment to Europe in 2015, almost one year on from its Syrian debut. Four F-22s from the 95th Fighter Squadron 'Boneheads' arrived at Spangdahlem, Germany, from their home at Tyndall AFB, Florida, on August 28.

Led by Lt Col Daniel Lehoski, the 95th FS commander, this deployment came following a number of hints from Air Force Secretary Deborah James that Raptors may be sent to Europe as part of the theater security package (TSP) detachment cycle, amid increased Russian military activity in the region.

The Raptors were supported by a C-17A Globemaster III and approximately 60

airmen and deployed under the Rapid Raptor Package concept, a standard team designed to enable the deployment of the F-22 to any theater, globally, within 24 hours. Upon the Raptors' arrival at Spangdahlem, Gen Frank Gorenc, USAF Europe and Air Forces Africa commander commented: 'This inaugural Raptor training deployment is the perfect opportunity for these advanced aircraft to train alongside other US Air Force aircraft, joint partners, and NATO allies.'

Lt Gen Timothy Ray, the 3rd Air Force commander, added: 'Today we open a new chapter of air power in Europe. With this deployment of the F-22 to Spangdahlem we do three things that are very important. First is to send a

very clear message to our European allies that we are committed to peace and security here and we will bring our most capable asset in the F-22 here. The second is to learn train alongside our American airmen that are here at the USAF unit, our joint partners and our NATO allies. Lastly, it's to validate our thinking in how we operate this airplane.'

Speaking to reporters on September 3, Lt Gen Ray played down the obvious questions about the reasons for the deployment, the link to Russian involvement in Ukraine, and increased Russian Air Force activity in the Baltic region. The emphasis on this deployment is training and

**Above:** F-22s from the 95th Fighter Squadron at Tyndall AFB, Florida, arrived at Spangdahlem, Germany, on August 28, 2015. This inaugural F-22 training deployment to Europe is funded by the European Reassurance Initiative. **USAF/ A1C Luke Kitterman**



## RAPTOR FACTS

First flight	September 29, 1990
First delivery	September 26, 2003
Initial operational capability (IOC)	December 15, 2005
Full operational capability (FOC)	December 12, 2007
Deliveries completed	May 5, 2012
Delivery total	187 aircraft
Weapons	AIM-9M/X AIM-120 AMRAAM GBU-32 JDAM GBU-39 SDB

interoperability. 'Our ability to react, our fortitude to support our NATO allies, and our ability to deliver combat air power at the time and place of our choosing must be clearly understood,' he commented.

This wasn't the first time Raptors have trained in European airspace. In 2010, F-22s from the 3rd Wing at Elmendorf AFB, Alaska, spent a short period at RAF Lakenheath, UK, where they flew missions with the resident 493rd FS following participation in the Royal International Air Tattoo. This time around the scope is clearly much broader and is funded by the European Reassurance Initiative.

Having arrived at Spangdahlem on Friday, August 28, after the weekend two

jets immediately moved on to Łask Air Base, Poland, on August 31, alongside four Spangdahlem F-16CMs. Here, Maj Gen Christopher Bence, 3rd Air Force and 17th Expeditionary Air Force vice commander and Robert Kupiecki, Polish Deputy Minister of National Defense, spoke to reporters. 'We continually rotate US forces from the US into Europe, and this is a part of the training rotation,' commented Bence. 'We look forward to continue to prove that fifth-generation aircraft can operate in Europe as we set the foundation for the future of the F-35 coming to Europe in just the next few years.' Following the successful two-week stay in Europe, the Raptors headed for home on September 11. 🇺🇸🇵🇱



**Right:** A 95th Fighter Squadron Raptor driver shuts down at Spangdahlem.  
**USAF/A1C**  
**Luke Kitterman**

**Above right:**  
F-22 serial 05-4086 departs Tyndall AFB for the European detachment.  
**USAF/A1C**  
**Sergio A. Gamboa**



# RED FLAG TURNS 40

For 40 years, exercise 'Red Flag' has been used to hone the skills of the US Air Force and its allies in high-end warfighting.

**report:** Jamie Hunter







**T**HE HOME OF the Fighter Pilot' proclaims a large sign at the main entrance to Nellis Air Force Base, just north of the glitz of Las Vegas, Nevada. This base, renowned around the world, is all about maintaining the exacting standards of the US Air Force. It hosts a test unit that helps develop advanced capabilities for the world's largest air arm, and the famed USAF Weapons School. Nellis is also the spiritual home of exercise 'Red

Flag', an air training exercise developed following the Vietnam War, when US Air Force F-4 Phantom II crews struggled in combat against nimble enemy MiGs. 'Red Flag' was designed to give these young pilots a taste of combat, so that when they went to war for real it wouldn't be a baptism of fire.

As the exercise has progressed, it has served as a proving ground for new technology, and the ultimate place for allies and partner nations to train

A flight of 94th Fighter Squadron F-22 Raptors is readied for a night 'VUL' (vulnerability period) on the southern EOR (end of runway), with the Las Vegas skyline and Stratosphere Casino providing a spectacular backdrop.

**Jamie Hunter**





Now that the 65th Aggressor Squadron has disbanded and disposed of its F-15s, the 64th AGRS and its F-16Cs now provides most of the airborne threat replication during 'Red Flag,' acting as enemy 'Red Air' forces against the 'Red Flag' participants. **Jamie Hunter**



**This image:**  
The E-3 Sentry provides the 'air picture' of the 'Red Flag' battlespace. The AWACS are regularly the first aircraft to launch and the last to land during 'Red Flag' missions. **USAF/A1C Brett Clashman**

**Above left to right:** Capt Danielle Esler controls aggressor aircraft during an air-to-air engagement from the Nevada Test and Training Range building at Nellis. **USAF/MSgt Jeffrey Allen**

It's not just about the fighters. 'Red Flag' integrates heavy bombers like this B-1B as well as intelligence and transport types. **USAF/A1C Brett Clashman**

together so that they too are best prepared for whatever may come over the horizon.

'Red Flag' was created in 1975. The aim of the exercise was simple: to offer pilots the opportunity to train in realistic, simulated, combat scenarios in a safe environment with measured results that could be debriefed in detail. Col Richard Suter, a Vietnam combat veteran himself, became the driving force behind 'Red Flag,' which was established under the 4440th Tactical Fighter Training Group. Today the exercise remains as popular as ever, and it remains a high-end large force employment (LFE) exercise that reflects real-world scenarios.

Now run by the 414th Combat Training Squadron, 'Red Flag' has, from its inception in 1975, been the benchmark







**Left:** A view of the typically busy flightline at Nellis during a 'Red Flag' launch, each of which can see upwards of 80 fighters getting airborne for the mission.

**Jamie Hunter**

**This image:** 'Red Flags' rely on tanker aircraft to keep the missions realistic. In fact, whole exercises have been canceled in the past due to lack of tanker availability.  
**USAF/A1C Brett Clashman**



for squadrons around the US Air Force. It has expanded from pure fighter tactics to whole force integration, in scenarios that represent the highest levels of complexity imaginable. Col Jeffrey Weed, the outgoing 414th Combat Training Squadron commander, comments: 'The training used to be fighter-oriented but now it encompasses all of the Air Force domains. The feedback from past participants has been outstanding — one pilot who went on a deployment said he would have been lost without the 'Red Flag' training, but with it, it had made integrating with other countries a breeze.'

Speaking following the recent 'Red Flag 15-4' iteration of the exercise series, Weed said: 'There has been great training with our sister-service Marine and Navy members. We had ground forces stay out in the field for the entire exercise and have had the broadest jamming capabilities from the Navy ever.'

It is hard to explain and understand the complexities of flying and fighting in such a vast and demanding environment. Many regard 'Red Flag' as being more complex than recent combat air operations, and arguably as tough a challenge as many pilots will face. 'You are trying to co-ordinate a huge number of aircraft in a relatively small piece of airspace, often operating dynamically and at night, while still maintaining situational awareness and still operating effectively', explained a visiting Royal Air Force pilot.

The scope of 'Red Flag's' training and its levels of integration between participants have been nothing short of revolutionary across the domains of air, space and cyberspace. 🇺🇸



Led by Maj Danny 'BLAM' Cannon, 'Jazz flight' sets up to unleash some pain on an adversary.

# BAYOU EAGLE MASTERS

Air National Guard F-15C squadrons boast a fine blend of rich experience and young blood. This combines to create a lethal air superiority capability, as efforts to sharpen the Eagle's talons for the future gather pace

**report and photos:** Jamie Hunter

**O**UR YOUNG WINGMEN are like pitbulls on a leash in a meat market. They are dying to get at everything. I say: 'There's a target, go kill it. See that over there? Go kill it.' As an F-15C flight lead I'm managing my pitbulls, but I also need to be able to spot when I need to put my fangs through the floor and get involved myself'. Sitting in his office, Maj Ben 'Evil' Cook, the director of operations (DO) at the 122nd Fighter Squadron, talks passionately about flying the F-15C, as do all his comrades on the squadron. They're queuing up to tell you how great the Eagle is despite its age, and how lucky they are to be flying it.

The city of New Orleans does many things very well — awesome cuisine, extraordinary music and some of the finest hospitality to be found in the entire United States. It is also the home to one of the most experienced and potent F-15C Eagle air superiority squadrons in the form of the 122nd Fighter Squadron, Louisiana Air National Guard, known locally as the 'Bayou Militia'.

The recent resurgence of the Eagle as a companion fighter for the F-22 Raptor for the next quarter of a century has put the spotlight back on the Air National Guard F-15C squadrons. Many viewed the Eagle as being old and on the verge of replacement. Not so. Nowhere will

you find stronger and more dedicated advocates of the mighty Eagle than here at Joint Reserve Base New Orleans.

## FIGHTER INTEGRATION

Maj Cook has flown the Eagle since 2002, and is representative of the wealth of experience in the Guard Eagle community. Yet the locker room at the New Orleans squadron also reveals an influx of new blood, with plenty of lieutenants earning their spurs alongside seasoned aviators. The media spotlight has focused recently on the situation in the Baltics and in Ukraine, Russia once again being seen as a real threat to regional stability. With recent deployments into Europe as part of





theater security packages (TSPs), renewed attention has been paid within the USAF to the air-to-air arena. A lack of aircraft numbers in the Raptor force, coupled with a juvenile F-35 Lightning II community, has put the Eagle in the frame to soak up the weight of the air-to-air mission, possibly until 2042 on current planning.

Integration between the Raptors and the Eagles is being re-emphasized. According to Cook, 'Our relationship with the Raptor community and particularly the 43rd FS, the Raptor schoolhouse, is very important. We are close to Tyndall [AFB] and it's great that their students get to work with Eagles from the outset.' The stealthy Raptor has many attributes, but endurance is not one

of them.

'We can last longer in the fight, we are the force multipliers,' says Cook.

Lt Col Matt 'Saw' Rippen is the commander of the 159th Operations Group here. He adds: 'When the F-22 first came online they were all flown by former F-15 guys. They flew it as if it was just an awesome F-15. Then they realized it's something much different. The Raptor is actually far better-suited to cleaning up a really ugly situation, unobserved.





'Us F-15 guys know we can't hide. We show up and everyone knows we're there, so we stir it up, throw a stick of dynamite in and kill what we can, then we fall back and the Raptor can come in and literally re-shape the battlespace. We aren't about being in the anti-access, going downtown-type scenario. The threat environment has advanced more than the F-15C has, so things need to be improved.'

While the F-15C has enjoyed some game-changing upgrades during its career, these had tailed off somewhat at the end of the last decade. The New Orleans unit had 23 jets on the line in October, comprising a few 1978-vintage 'Silver Eagles' with the original APG-63(V)0 radar, plus an even mix of aircraft with the (V)1 radar and 'Golden Eagles' with the brand-new (V)3 — 'vee-three' — active electronically-scanned array (AESA) set.

Lt Col Rippen calls the (V)3 'the biggest and baddest fighter radar flying. It has the biggest array and the highest power output.' Maj Cook adds: 'The (V)1 is still a really good mechanically-scanned radar, probably the best the US will ever field, but the (V)3 has changed our ability to match the long-range threats and some of the developments that have been made to make aircraft harder to find on radar. It's also helped our maintenance guys, we get fewer nosebleeds now' — he says referring to previous issues with hydraulic leaks in the workings of the 'mech-scan' radars. 'It's a force-multiplier for us because we can do so many things with

one radar that in the past you needed two or more radars to do. We also now have the AIM-120D AMRAAM, and the AIM-9X.'

The jets on the flightline at New Orleans are upgraded to Suite 6 Operational Flight Program (OFP) standard. Suite 7C is planned next, the main purpose of this being the ability to host the forthcoming Advanced Display Core Processor II (ADCP II) mission computer. The Eagle Passive/Active Warning and Survivability System (EPAWSS) is now on contract with Boeing, its purpose being to transform the Eagle's ability to look after itself. EPAWSS will sample the RF spectrum, identify threats, prioritize and allocate jamming resources against them. Cook says: 'We would love to have EPAWSS tomorrow. We haven't put a lot of emphasis on the defensive side of the F-15, it has mostly been about the helmet [Joint Helmet-Mounted Cueing System], the missiles and the radar.'

One of the latest upgrades for the Air National Guard Eagles is the Passive Active Sensor (PAS) display. It will be used initially to display imagery from the Sniper advanced targeting pod, which the Guard F-15C community is now receiving. Cook says: 'They are taking out the right side of the dashboard and giving us the F-15E engine display and a large new display that looks like an iPad. PAS is not tied to the Sniper pod, but it means we can process another sensor and display it. Our jets are being modified right now for PAS and will carry Sniper. Each Guard Eagle unit will get six pods — we'll typically have two on our alert mission jets and four for

training.' The Sniper pod will enable the F-15C to visually identify targets at long range and sense infra-red signatures.

## 2040C

Air Combat Command chief Gen Herbert 'Hawk' Carlisle recently acknowledged the high cost of keeping the F-15C relevant to the fight in an era of already constrained budgets. Boeing has an F-15C in a four-year cycle of fatigue testing; the type is currently rated for a 9,000-hour service life, and the goal is to double that lifetime to 18,000 hours. Fatigue testing indicates that new longerons and wings will be required to keep its aging Eagles flying.

Boeing is now pitching the so-called F-15 2040C, essentially a menu of options to keep the F-15C relevant until 2042 and the advent of the Next-Generation Air Dominance aircraft.

Mike Gibbons, Boeing's F-15 vice president, told the Yearbook: 'You can look at the budget the USAF has put into modernizing the F-15 and the continued development of the F-15 to get a good sense of how the Air Force is in this for the long haul. That makes perfect sense, because for the air superiority standpoint the F-15 is really a niche. We know it is a great multi-role strike platform with the F-15E model, and that it fills that purpose well. But in air superiority, there are only two jets in the USAF inventory that do that mission — the F-15 and the F-22. There are only a limited number of F-22s out there and many more F-15s — they will not be replaced with another air

### This image:

Flying over the Superdome — home of the New Orleans Saints — in downtown New Orleans.

### Right top to

bottom: Lt Col Matt 'Saw' Rippen examines the 'turkey feathers' on the Pratt & Whitney F100-220 engines during pre-flight checks.

The Joint Helmet-Mounted Cueing System and AIM-9X Sidewinder combination makes the F-15C lethal at close range.

The maintainers at the 122nd FS take huge pride in generating a strong mission-capable rate.







superiority platform until close to the 2030 timeframe. Until that platform has been fully integrated, there will be a transition period. And so the USAF has gone public that [it is] counting on the F-15 until 2035 to 2040 to be a dominant air superiority platform, which clearly means we — the USAF and Boeing and all of our supplier team-mates — have got to keep this platform growing in development. [The USAF] has enough flight hours to support the aircraft through 2040 with sufficient safety margin beyond that.’

The 2040C seeks first to address the F-15C’s weapons-carrying potential. The ability to carry up to 16 air-to-air missiles makes it an ideal support act to the limited load potential of the F-22. The 2040C would not, however, initially be able to carry these weapons in the same manner as the Advanced F-15. The addition of digital fly-by-wire on the Advanced F-15 opened up the potential for activating stations 1 and 9 on the outer wings. The FBW system is able to overcome the instability caused by the new stations. However, a non-FBW Eagle, such as the F-15C, would not be able to benefit from the additional outer pylons. Therefore, Boeing’s offering for the F-15C places four additional air-to-air missiles on new conformal fuel tanks (CFTs) instead. If the USAF opted to add FBW controls to the aircraft, then stations 1 and 9 would become an option.

The USAF F-15C has always been ‘plumbed’ for CFTs, but they are rarely carried, unlike on the Strike Eagles. The F-15 2040C pitches a new, lighter-weight CFT design that still offers fuel-carrying potential. Mike Gibbons comments: ‘We can carry more of each missile type either off of the racks on the CFT or the inboard station. And that’s why we say the number is ‘16 or more,’ depending upon whether the customer wants to use the outboard pylons or not.’ A Boeing artist’s impression of the 2040C suggests the pylons would be very similar to the BRU-61 Universal Armament Interface (UAI) already carried by the F-15E community.

The fighter integration element with the F-22 will require some smart thinking to harness the best methods of communications between the two platforms. So-called ‘fifth-to-fourth-generation’ communications have been problematic to say the least, and Boeing’s Talon HATE pod addresses this as a rapid-prototyping concept. To begin with, it



“We have one screen and one radar B-scope. The scope is black and green and really small. We call it the ‘drool cup’ because we stare into it so intensely, we might start drooling’

**Maj Ben ‘Evil’ Cook**





will be fielded in a limited capacity — four engineering and manufacturing development (EMD) pods are on contract — but only by the three remaining active-duty Eagle units. A smooth method covertly to exchange data between the F-22 and an F-15C will be essential in ensuring that the ‘sensor’ F-22 can pass target data to the missile-laden F-15Cs.

Talk of the 2040C has already filtered down to the ANG squadrons, and it’s been a shot in the arm for the community. The various options being put on the table are energizing the lively discussion in offices and crewrooms alike. Maj Cook comments: ‘Most of us think we should go with CFTs because it opens up so many options. The only problem with CFTs is that you can’t punch them off, so if you get in a turning merge with a ‘Flanker’ and you have CFTs full of gas you are at a performance disadvantage. We’ll probably see a mixed fleet, some with CFTs and some without.’

**Left:** A wall of Eagles pushes into the fight.

**Below left to right:** Eagle aficionado Maj Ben ‘Evil’ Cook.

Climbing out of NAS JRB New Orleans.

Pilots ‘step’ for the morning ‘go’.

## EAGLE TALK

What ANG F-15 squadrons don’t lack is fighter pilot talk. As an outsider looking in, it’s difficult to understand how the complexities of the air-to-air mission play out in an F-15C, which still retains a fairly rudimentary cockpit.

Cook explained some of the dynamic work that defines the Eagle ‘office’. ‘Situational awareness [SA] is what this is all about, working out where everybody is — and that starts with a good plan. The pilot leading the mission is the one

who needs the greatest and clearest SA, so he can literally spend a whole day working that plan, more if it’s an upgrade ride. In general, we kinda know which plan fits which scenario, and what’s most likely to occur, but you have check points throughout the fight which will determine when you need to regain your SA. It can be something like, ‘when Mickey Mouse says it’s 15 minutes after the hour I want you here looking this way, I want you there looking that way,’ so you have those check marks. That way, if it’s all going to hell in a hand basket, I can look at my watch and say at 15 minutes after the hour I need to be here and looking this way.

‘We have one screen and one radar B-scope. The scope is black and green and really small. We call it the ‘drool cup’ because we stare into it so intensely, we might start drooling. We get so much information from that little scope, but it has only so much space for important information, so there’s no extraneous stuff on it.’

The JHMCS has helped pilots to build their SA, and targets, primary flight data, wingmen and so on are all projected into the line of sight. The Fighter Data Link (FDL) has also helped greatly, but as Cook comments, ‘It was awesome to start but gradually other players started to get it. That was good because you could tell where they are, but now everyone has it. At the last ‘Red Flag’ everyone was on the net — the Growlers, Strike Eagles, F-16s — and there was so much information it was hard to decipher it all on our small







screen. We almost had to go back to square one and see what Mickey says!’

The young pilots coming out of flight school to a squadron like the New Orleans unit may be able to fly the jet, but they’re still green and inexperienced. They flourish as they become more polished on a front-line unit. Cook continues: ‘When I was a brand-new two-ship flight lead at the ‘Reapers’ at RAF Lakenheath we went to ‘Red Flag’. On one of the first missions I was supposed to be the number eight guy; down the back of the formation as a wingman. The number seven in the flight had an INS [inertial navigation system] problem as we taxied out between the Nellis runways, so he couldn’t tell where he was in the airspace. Normally you’d kick him out to go to a spare, but he could still fire his missiles, so the mission commander said: “Evil; you’re flight lead’. So I’m up there trying to process the whole thing, the comms, the jamming, the whole ridiculousness of a ‘Red Flag’ and we were in the wrong spot all day. It was my first opportunity as an experienced wingman and I failed.

‘Thankfully I got the opportunity to go back to ‘Red Flag Alaska’ in 2009 with the 2nd FS as an instructor. We were ‘rainbowed’ with the 19th FS and we were flying the older jets from the B-Course. But we were wily old fighter

*“We have never really changed our perspective on air superiority. It’s our only mission, so we’d better be pretty good at it”*

**MAJ WILLIAM  
MACALUSO**

pilots. My jet had a problem at the ‘push’, so I was re-starting some of my systems at the initial commit — I couldn’t get a shot off the rail. So I’m there, looking at seven other Eagles who are cranking and doing all sorts. As we come back around, we [were] almost at the merge with the ‘Red Air’ and now I was ready. Kill! Kill! Kill! Sometimes by a second or two my simulated missile shot got to a target before my wingmen, but all eight of my simulated shots turned out to be good kills, plus I got two guns kills, one of which was on none other than ‘MiG 1’. We were in the debrief and I was calling ‘stop, time’ for my shots. He said:

“Evil, aren’t you out of missiles yet?’ I remember thinking, ‘This is the best day I’m ever going to have!’ That’s the goal, to be in the right position at the right time; being able to make every shot count. It takes a lot of practice, a lot of patience and a good amount of luck. That sortie in Alaska is not typical in any way and it’s never a solo effort. Being an effective part of the team is what we are constantly striving for.’

## GUARD DUTY

Maj William Macaluso is a traditional Guardsman, known as a ‘Guard baby’. Brought up in New Orleans, he joined the Louisiana ANG as an enlisted intelligence officer, before being selected for pilot training. ‘I went through training at Vance AFB, the same as active-duty pilots, and went to the FTU [Formal Training Unit] at Klamath Falls with the Oregon ANG. When you come to the squadron out of the training unit you need some polishing, so you are full-time to start with. Now I’m part-time and I’m also in law school. When you first come to the squadron, the weapons officer hones the new guys. When someone gets hired into the Guard there’s the potential that they will be there for the next 20 years.’

Talking about the perceived new emphasis on the air superiority mission,

**Above:** Despite its age the Eagle is still a fearsome long-range and close-in fighter. The new AN/APG-63(V)3 radar has made a huge difference to its ability to detect small targets.

**Right:** ‘Turning and burning’ — a pair of ‘Bayou Militia’ Eagles hits the merge.

**Inset:** ‘CLAM’, one of the young lieutenants at the 122nd FS, gives his crew chief a thumbs-up as he is ready to crank his engines.





Macaluso comments: 'We have never really changed our perspective on air superiority. It's our only mission, so we'd better be pretty good at it. Air-to-air is a perishable skill — we really notice it much more when we have a break from flying, so the focus needs to be there.'

Lt Col Rippen adds: 'Here we have the state and the federal mission, and we recognize that we have a growing international commitment. Anybody that knows anything about the air superiority role understands that it is one fluid, dynamic, situation.' Asked about the need to go into the merge, rather than solely performing the mission from beyond

visual range (BVR), he adds: 'Many things can prevent you from employing weapons BVR. It can be rules of engagement, jamming, all sorts of reasons. Western air forces don't go shooting at the drop of a hat; fratricide is a vital consideration for us.'

Homeland defense is the squadron's core mission, and Lt Col Brian 'Patch' Marbach says the F-15 is ideally suited to this. 'Five Guard F-15 sites handle the alert mission: here, Florida, Fresno, Massachusetts and Oregon. We are on alert '24/7'. In the past we were the 'break glass in case of emergency' unit, but it's clear we have more deployments now. We have a lot of experienced guys here

who have come through active-duty but now don't want to move around as much. We try to hire young and old guys because it keeps energy in the squadron. Normally in a Guard squadron you have full-timers and part-timers, but right now we are mainly full-time here. We also have a huge amount of experience here on the maintainer side.'

Maj Cook adds his praise of the dedicated maintainers that keep the F-15s in the air. 'This airplane is 40 years old, but the maintainers working hard out on that flightline and in our hangars understand how it works. We can add in new avionics and we will probably retrofit new wings, but I honestly don't think anyone could build an airframe that can compete with the Eagle. The USAF has put a lot of money into stealth and it's an unbelievable advantage, but everyone knows that.'

As to the future, the ANG will most likely upgrade the remaining (V)1 radars to (V)3, and there remains a wide range of options for the old 1978-model 'Silver Eagles,' from the boneyard to a major upgrade. 'Everything is on the table,' says Maj Cook — 'new wings, a complete re-wire for the 'Golden Eagles'. This is a tough jet, and I believe the versatility of the airplane will ensure we are flying the Eagle all the way to 2042.' ★=





# REPLACING THE TALON

The US Air Force's eagerly-awaited competition to replace the venerable T-38 Talon has not compromised for price over performance, with clean-sheet designs now very much in the frame for the lucrative deal.

**report:** Jamie Hunter

**T**HE US AIR Force released the eagerly-awaited formal requirements list for its T-38 Talon replacement program in March 2015, kick-starting the process that will lead to selection of a new fast jet training aircraft. This is the last step before contractors will be invited to respond to a request for proposals (RFP) for the T-X competition — it is expected that this will be released in the fourth quarter of Fiscal Year 2016, with a contract award in the fall of 2017.

The USAF wants to buy 350 T-Xs to replace the 431 T-38s in Air Education and Training Command (AETC), with initial operational capability (IOC) being slated for the end of 2023 in both the undergraduate pilot and introduction to fighter fundamentals (IFF) training roles. According to AETC, the period of operation for the T-X is 2026 to 2045, and the aircraft is set to fly 360 hours a year, at a mission readiness rate of at least 80 per cent.

A broader list of draft requirements was initially set out in the key performance parameters (KPP) document, released in

October 2012, which allowed industry to make a 'first pass' at refining planned offerings for T-X. The Air Force is keeping a close eye on cost when it comes to this program. Indeed, the formal requirements document was the first to fall under the USAF's new 'Bending the Cost Curve' initiative. Secretary of the Air Force Deborah Lee James has made no secret of the need to build affordability into acquisition processes.

Brig Gen Dawn Dunlop, AETC's director of plans, programs, and requirements at the time of the release endorsed the strategy. 'The T-X requirements are being released approximately 10 months earlier than under the normal acquisition process and [this is] part of an ongoing effort for more deliberate and open engagement with industry', she said.

## REPLACING THE TALON

The US Air Force says that the T-38 has had its day. It is no longer effective at preparing student pilots for the advanced aircraft the Air Force is flying now and will fly in the future. The 1961-vintage T-38 has been a stalwart trainer, extensively

upgraded with a partial 'glass' cockpit to help keep it relevant in the F-15 and F-16 era. That of the F-35 and F-22, however, is not proving quite so forgiving.

Brig Gen Dunlop said 12 of the 18 advanced pilot training tasks that are prescribed cannot now be completed in a T-38. This places the onus on operational conversion units to take up the slack, adding expensive flight hours in precious jets. The USAF is keenly aware for the need to 'download' some of this training to cheaper platforms — namely T-X — and the service thinks it could save 15 per cent in annual operating costs for advanced pilot training as this strategy becomes possible.

'Cockpit and sensor management is fundamentally different today in fourth- and fifth-generation aircraft than it was when the T-38 was built in 1961', Dunlop said recently. 'While







**Above:** The T-38 Talon has seen sterling service with the USAF in the advanced training role, but its age is starting to show and a replacement is obviously required.

**Jamie Hunter**

**Left:** 1st Lt Kyle Brown pre-flights a T-38 at Joint Base San Antonio-Randolph. **USAF/Johnny Saldivar**

the T-38 has been upgraded to a 'glass' cockpit, the inability to upgrade the T-38's performance and simulated sensor capability presents a growing challenge each year to effectively teach the critical skills essential to today's military pilots'. Dunlop says that AETC can no longer teach air combat maneuvering (ACM) in T-38s because it is so different compared to the cutting-edge fighters on the front line. The Talon offers zero capability for things like night vision goggles (NVG) training, use of smart weapons, or formation flying out of visual range — a tactic of the modern datalink generation. The type is also showing its age from a maintenance perspective. Aircraft assigned to AETC have not met the command's requirement for a 75 per cent mission-capable rate since 2011 and the Talon's mission ready stats hover below 60 per cent right now.

## TOUGH REQUIREMENTS CHANGE THE FIELD

When the competition to replace the T-38 was formally started in 2010, it seemed that the USAF would favor a fair price over performance. The key competitors rushed to offer off-the-shelf products, only Boeing saying that it was going to pitch a new 'clean-sheet' design. However, as the performance requirements became clearer in 2015, it was obvious that many of the offerings wouldn't make the cut.

Three significant performance characteristics stood out among over 100 points in the March 2015 requirements list for the T-X: a sustained turn rate of a minimum of 6.5g, simulator visual acuity and performance, plus aircraft sustainment. That minimum sustained G requirement immediately threw

question marks over some of the significant platforms being offered for the competition. The G threshold was set at 6.5g, but with an aspiration to hit 7.5g — this is considered sufficient to ensure that students can operate at 9g in a front-line fighter.

The future was very much in mind as the requirement called for embedded training with synthetic sensors and a datalink. Other capabilities include the need for in-flight refueling (the aircraft must be at least adaptable to being fitted with an aerial refueling kit, but built-in capability is preferred), a 10 per cent reduction in fuel consumption over the T-38, and a minimum runway length for take-off of 8,000ft, plus crosswind limits of 25kt on a dry runway and 20kt if wet.

Both cockpits will have identical displays and controls, and the aircraft is

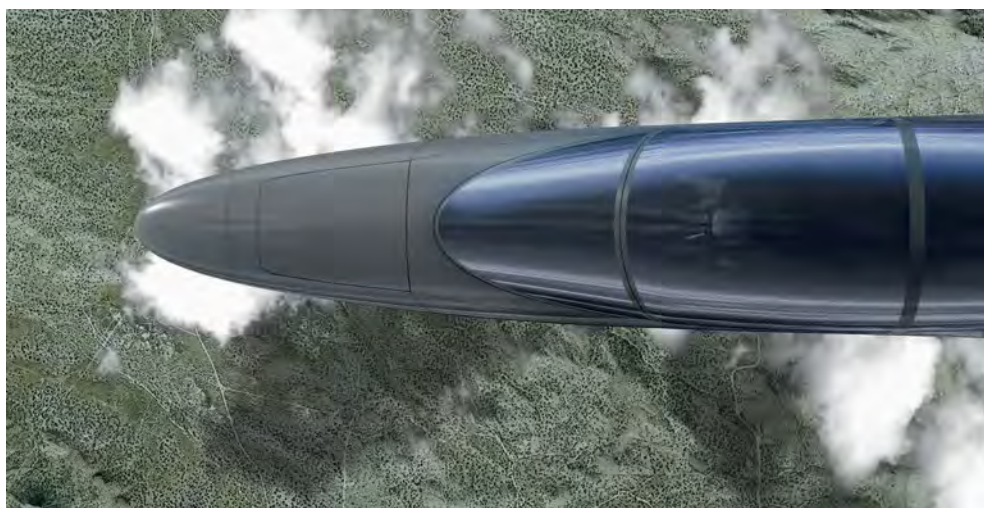




to feature terrain and collision avoidance equipment. The T-X winner have the switchology for simulated weapons release of both air-to-air and air-to-ground stores, and be able to carry a weapon systems support pod and a travel pod. The cockpits will feature wide-area displays, as per the F-35, and be compatible with NVGs.

The wide-area display decision was actually based on industry input. While AETC's requirement is simply to ensure that the student pilot can handle tasks such as avionics management and sensor integration, industry proposed options that attempted to mirror the F-35 display. This has been adopted to meet the advanced training mission of teaching avionics integration and sensor management. Dunlop says that industry demonstrated that the wide-area display actually represents a lower-cost solution that provides more adaptability in the long term.

The much-publicized aggressor role for the T-X does not appear in the requirements. In fact, USAF officials say that recent story relates to a plan to use Fiscal Year 2016 budget money to study future T-X upgrades. The FY 2016 budget includes approximately \$40 million for planning or development options related to T-X. Gen Robin Rand, outgoing commander of AETC, commented: 'A T-X variant is just one option for 'Red Air' if we decide there's a requirement for it'. Rand added: 'We think our requirements will allow the airplane to absolutely do those things... Will it have that capability? We think it will, but it's got to be done affordably. It is just one option for 'Red Air' if we decide there's a requirement for it.'



## THE COMPETITORS

Interested parties had until May 10, 2015, to respond to the USAF and state their intent to participate in T-X based on the latest requirements.

Boeing was first to break cover, with plans for a clean-sheet design announced in 2010, but many speculated that this would be prohibitively costly when having to factor in design and development costs over an existing design. When the T-X program was first announced, the Air Force hinted to industry that it was looking for an affordable, off-the-shelf system. However, Boeing stuck to its guns and remained confident with its strategy, while playing its cards close to its chest. This led to all sorts of rumors of a Boeing T-X prototype being built by the company's Phantom Works.

It was Boeing's teaming with Saab that really changed the game when it came to clean-sheet solutions for T-X. Saab has a strong track record of keeping development and flight-testing costs low,

driving down production costs through smart new processes. It started to look like a clean-sheet design, built exactly to Air Force requirements, at an affordable price point, could be a way to win T-X — but the pressure would mount on the USAF to keep costs in check.

While Boeing was talking clean-sheet, its competitors had hastily entered into partnering agreements regarding existing designs. Northrop Grumman was teamed with BAE Systems to propose the Hawk Advanced Jet Trainer, Lockheed Martin and Korea Aerospace Industries were offering the T-50 Golden Eagle, and General Dynamics partnered with Alenia Aermacchi to put forward the T-100, a T-X derivative of the M-346 Master.

However, as the USAF fleshed out its requirements, all were secretly having doubts over their respective off-the-shelf solutions. Indeed, only one camp is now offering such a product.

Lockheed Martin remains faithful to Korea Aerospace Industries and the T-50. The company has stated that it could

**Top:** Lockheed Martin looks set to stick with its T-50 proposal, rather than a clean-sheet design.  
**Lockheed Martin**

**Above:** Boeing has released a tantalizing artist's impression of the cockpit area of its T-X design, which reveals a large overall configuration.  
**Boeing**

**Right:** Textron AirLand is expected to offer a new T-X derivative of its Scorpion ISR jet.  
**Jamie Hunter**



also offer a clean-sheet aircraft, but off the record LM says this is not likely. Rob Weiss, executive vice-president and general manager of Lockheed Martin's Skunk Works advanced development programs, said the company has a clean-sheet design for T-X on hand on the off-chance that the T-50 cannot meet the requirements for T-X: 'Back in 2010, when this really started getting going as a program, we looked at clean-sheet alternatives as well. And we've kept a low-level effort going on the clean sheet.'

Northrop Grumman had little choice but to ditch the Hawk bid in favor of another brand-new design. Company executives have said that decision was made after the service requirements became clear. Responding to questions, Northrop stated: 'In 2011 we entered the fight with the Hawk and with an RFP schedule to be on the horizon in early 2012. We stood behind the Hawk as the best solution at the time. As the program moved to the right and the timeline grew, the Air Force requirements began to evolve and we gained greater insight into what capability was really needed for T-X. It became more and more clear to us that the Hawk was no longer the optimum solution in terms of requirements and affordability. We as a team made the decision to no longer offer the Hawk and to incorporate a new air vehicle into our T-X solution.'

While this came as a blow for BAE Systems and for the Hawk, it wasn't all bad news. BAE Systems' experience and capabilities in pilot training is seen by Northrop as crucial to its bid when it comes to embedded air vehicle training

capability. The world-beating embedded synthetic training afforded by the Hawk AJT is viewed as being essential as Northrop develops its T-X contribution.

Northrop Grumman is only progressing with a clean-sheet solution, and not retaining an off-the-shelf proposal. 'Divided tracks lead to divided focus, and our team is committed to offering one integrated family of systems solution that affordably meets the requirements of the Air Force,' the company stated.

Yet another new T-X design is likely to be rolled out by Textron AirLand, which is reported to be preparing a modified version of its Scorpion ISR aircraft.


The other remaining off-the-shelf solution was the T-100, a collaboration between General Dynamics and Italy's Alenia Aermacchi based on the latter's M-346 design. However, in early April General Dynamics dramatically pulled out of T-X. Its decision to ditch its T-X effort as a prime contractor was announced on March 26, just a week after the Air Force released its final program requirements.

As with Northrop Grumman, General Dynamics' move appears to reflect a realization that it too could not compete with an existing design. The M-346 had looked a strong candidate early on in the T-X competition, but presumably its lineage in the Russian Yak-130 did little to help its cause in the US. As the requirements were set out, it was obvious that the G threshold set by the USAF would be challenging for the M-346. A General Dynamics statement said: 'When the program was as an off-the-shelf airplane, we believed that our

program management skills provided value-add to the customer. However, as the program moved from an off-the-shelf-only airplane to a more engineered trainer, we no longer believed that value proposition existed.'

Unless Alenia Aermacchi can find a new US prime — Raytheon has been mooted — it is unlikely to go it alone with the M-346. Foreign companies don't exactly have a great track record in USAF programs. CEO Giuseppe Giordo stated: 'Finmeccanica-Alenia Aermacchi is talking with a new major US prime contractor and it is fully committed to the North America market.'

The T-50 could end up as the only off-the-shelf aircraft being offered for T-X. The contenders have shifted substantially as the Air Force's schedule has repeatedly been delayed. The Air Force is going to have to work hard to keep its list of requirements on a tight leash in the course of what looks like being a complete design, development, and production program. Speaking during an advanced pilot training industry immersion event in September, Brig Gen Dunlop's successor, Brig Gen Andrew Croft, said: 'In accordance with the Secretary of the Air Force 'Bending the Cost Curve' initiative, our dialogue with industry during this event will further our efforts toward delivering the Advanced Pilot Training T-X system with the best value that meets our requirements.' Incoming AETC commander Lt Gen Darryl Roberson added: 'I've now had the opportunity to engage with industry on T-X and I am better informed about what our prospective Advanced Pilot Training vendors plan to offer.'

Clearly, industry will be asked to shoulder a large percentage of the risk. The new platform will presumably become the aircraft of choice for many F-35 operators around the world, either through partner training programs in the US or by direct acquisition, so the potential for the T-X winner is huge. As well as a large domestic market to replace the T-38, there is growing awareness that a successor to the T-1 Jayhawk is also needed. While T-X program managers will be keen to avoid over-complicating T-X for now, a multi-role training program that embraces 'Red Air' and navigator training over time might just allow the elimination of other types in the inventory and streamline fleets in the future. 

*'Brig Gen Dawn Dunlop says 12 of the 18 advanced pilot training tasks that are prescribed cannot currently be completed in a T-38'*





# 'HOGS' IN EUROPE

A-10 Thunderbolt IIs were once a very familiar sight in Europe, and in 2015 that was the case again, as various A-10 units deployed to the theater.

**report:** Rens van Rijn, Dennis Vink, Neil Dunridge and Kevin Jackson

**N** EWS IN OCTOBER that the US Air Force was deploying A-10C Thunderbolt IIs to Incirlik, Turkey, to accelerate its air operations in Syria against the so-called Islamic State (IS) capped a year that has seen significant operational activity within the 'Warthog' community. Twelve A-10s from the 23rd Fighter Group at Moody AFB, Georgia, replaced Aviano-based F-16s in Turkey for the ongoing regional operations under 'Inherent Resolve'.



The presence of A-10s in Europe earlier in 2015 kicked off as a result of Russia's intervention in Ukraine, which began in February 2014. The US took rapid steps to express solidarity with its European allies. In a process designated as Operation 'Atlantic Resolve', US air, ground and naval forces in Europe were immediately augmented. This was a demonstration of Washington's continued commitment to NATO in maintaining collective security to ensure peace and stability in the region.

A new method of expanding the number of air assets in Europe is to deploy units under the concept of a so-called theater security package (TSP) rotation. Lt Gen Darryl Roberson, the 3rd Air Force/17th Expeditionary Air Force commander, commented: 'TSP is a long-range, strategic capability to allow the Air Force greater flexibility against evolving threats. It is not tied to a specific platform or aircraft, but instead is a method of presenting forces at the right time to

**Above:** The 'Hogs' are back — a 'Bulldogs' A-10C flies with two 493rd FS F-15Cs from RAF Lakenheath in March. **USAF/ Jim Haseltine**

**Right:** The incoming 354th FS commander Lt Col Ryan Hayde. **PHODOCU**





the right combatant commander. Our abilities must remain agile to sustain and increase regional security'. Roberson welcomed the 354th Expeditionary Fighter Squadron (EFS) at Spangdahlem Air Base on February 18, 2015, as the first unit to fulfill a TSP deployment in Europe.

### 'HOGS' ARE BACK

Home-based at Davis-Monthan AFB, Arizona, the 354th EFS deployed more than 300 personnel and 12 A-10Cs to Spangdahlem, Germany. After a few days of familiarization flights, the pilots adjusted to the European theater and began training with their NATO allies. Six weeks later, on March 30, the squadron moved to Câmpia Turzii, Romania.

Initially the 354th EFS deployment was led by Lt Col Steve 'Cajun' Behmer, dual-hatted as commander of the 354th Fighter Squadron (FS) back home at Davis-Monthan. Remarkably, while abroad a two-fold change took place on May 15, when Lt Col Ryan Hayde assumed command. According to Hayde, 'I showed up about three weeks earlier to get a hand-off from 'Cajun'. Then we did the change of commands and he left the next morning.'

Prior to this event, Hayde had never served in the squadron: 'I did six months at Al Udeid [Qatar] working in the CAOC [Combined Air Operations Center]. When coming back, I had to be re-qualified on the A-10 because I had gone to school for a year prior to that. When I finished that qualification, I went to Nellis for two weeks and then came out here.'

Ninety days and many flying hours later, the 'Bulldogs' moved again, this time to Łask air base in Poland on June 29, their last stop before heading home. Considering the squadron's small footprint with limited manpower and just a dozen A-10s brought to Europe, the 354th EFS built up an impressive list of accomplishments in terms of training opportunities. 'The number of nations that we have supported is in the twenties,' Hayde stated. 'We have flown with their aircraft and operated with their JTACs [Joint Terminal Attack Controllers] on the ground. We are very used to working with JTACs of almost any nationality that we integrate with, for instance back in the States when we are at 'Green Flags'. There is a NATO JTAC qualification, and as a FAC-A [Forward Air Controller — Airborne] we have the same qualification requirements. One NATO

country can 'plug and play' with another NATO country and they all have the same training, the same standards, use the same books, and so at times it doesn't really matter if it's either a Romanian, Czech or a US JTAC — they all operate the same way.'

Another example of capability was demonstrated during Operation 'Cavalry March' as the US Army's 2nd Squadron, 2nd Cavalry Regiment took nearly 100 vehicles on a two-day, 400km road movement across Romania. On May 13-14, the 354th EFS worked alongside US Army AH-64 Apache gunships in securing safe passage for the ground forces, with A-10s performing multiple low passes over the convoy. Combat search and rescue (CSAR) operations were conducted, primarily with HH-60G Pave Hawks from the 56th Rescue Squadron. Based at RAF Lakenheath in the UK, this USAFE unit welcomed several A-10 micro-deployments over the course of the 354th's presence in Europe. All the 'Bulldogs' stopped there again for a few days before heading back to Arizona in early August.

### KNOWLEDGE RE-GAINED

This past half-year has been an incredible period for the 'Bulldogs', and gaining so much experience will only enhance future operations. Most A-10 pilots had already deployed before, mainly to Bagram or Kandahar in Afghanistan, although a few others were first-time deployers who had just graduated from A-10 training prior to this TSP assignment. 'It has been great for six months,' said Hayde, 'but obviously at the end of that the guys miss their families [and] thus want to get back to the States. But we've really enjoyed our time over here.'

The units assigned to the TSP are re-gaining operational knowledge lost when a lot of the permanently-based USAFE units left Europe. Operating in a foreign country is always a challenge and taking things for granted can really be a pitfall, according to Hayde. As people with dissimilar backgrounds will likely have different expectations, it can be hazardous to make certain assumptions. 'Really, what you do is [have] no expectations and just take a big step back,' he said. An iterative process of knowing which questions to ask gradually cuts lead times, with fewer miscommunications resulting in smoother operations. Stepping out







of that local environment will 'keep everyone sharper', as Hayde put it, while flying in unfamiliar airspace and dealing with different situations forces a pilot to adapt. 'We are pretty good at adapting right now, since we adapted every day in Europe.'

## WILD BOARS

No sooner had the 'Bulldogs' touched down back in Arizona than 200 Reservists from Air Force Reserve Command (AFRC), active-duty airmen, and personnel from the Air National Guard (ANG), along with eight A-10Cs from Whiteman AFB,

Missouri, arrived at Ämari air base, Estonia on Saturday, August 22. The 'Hogs' from the 303rd Fighter Squadron, part of the 442nd Fighter Wing, were in the smallest Baltic state for a three-week flying training deployment as part of Operation 'Atlantic Resolve' (OAR), a further phase of the collective security measures.

Maj David 'Rox' Kirkendall is a Reserve A-10C pilot with the 303rd FS and project officer for the unit's OAR deployment. 'Rox' explained that there was a wide range of objectives beyond simply flying in the region. 'From an overall perspective, what are our objectives? The number one

objective is to build partnerships, not only with Estonia who have been gracious hosts, but also Lithuania and Latvia. Another objective is Joint Terminal Attack Controller [JTAC] training for the people here, and we also wanted to do some dissimilar air-to-air flying.

'Part of it is an exercise on how we, the 442nd Fighter Wing, project air power. How do we go from Missouri to here, what do we bring? What do we do? Our presence here is the number one mission, showing our support and deterring aggression from other countries. So, just by being here we've done the mission, right? Well, not so much. It's also about showing we can integrate with Estonia, Latvia and Lithuania. We're sharpening our skills and their skills.'

Regional tactical flying with local armed forces was the centerpiece of the 442nd FW's OAR presence, employing the core competences of the A-10C — close air support (CAS), 'Sandy' combat search and rescue support, and forward air control — air (FAC-A). Despite the small size of the Estonian Defence Force, the local personnel were eager to work with the 442nd FW, providing their US guests with first-class support and facilities at Ämari and the nearby Tapa weapons range.

**Above:** A pair of 303rd FS A-10Cs approaches the tanker. The 351st Air Refueling Squadron/100th Air Refueling Wing at RAF Mildenhall, England, supported most of the daily A-10 sorties out of Ämari.

**Kevin Jackson**

**Left:** The 354th EFS participated in 21 exercises in 22 countries during its deployment, logging nearly 2,700 flight hours on more than 1,500 sorties. **USAF**

**Right:** A-10Cs from the 23rd Fighter Group arrive at Incirlik AB, Turkey in October. **USAF**





Beyond the borders of Estonia, history was made by the 442nd FW when Maj Rick Mitchell and Capt Sven Loeffler, both A-10C pilots with the 303rd FS, became the first US fighter pilots to land a jet at Lielvārde air base in Latvia on August 26.

The 303rd FS notched up another notable event as operators of the first A-10s ever to land in Lithuania. Lt Col Michael Leonas and Capt Geoffrey Manter arrived at Kaunas Airport on September 9 following JTAC training using CAS with the Lithuanian military at the Rukala range.

In addition to working with Estonian, Latvian and Lithuanian forces while deployed to Āmari, the 303rd FS was presented during its time in Estonia with an opportunity to carry out a combined flight training event with Finnish Air Force (Ilmavoimat) F/A-18 Hornets. DACT with F/A-18s is a rare occurrence for A-10s, and a 'win-win' situation therefore presented itself — a cost-effective means of supporting the training of Finnish fighter pilots while ticking another box in the training program of the A-10 pilots. An additional objective was to

rehearse various aspects of international operations in the areas of mission planning, execution and debriefing.

Some sorties were flown in international airspace, but primarily they took place in Finnish airspace to the west of Pori, off the south-western coast of Finland. A single combined 2-v-2 DACT wave flew each day, with the Finnish Air Force designating two F/A-18s and the USAF contributing two A-10s.

## RETURN JOURNEY

Lt Col 'Virga' Ramos was lead pilot for the return journey to Whiteman AFB. 'We departed out of Āmari air base on September 14 as two separate four-ship cells,' he said. 'We re-joined with our tankers [from the 157th ARW at Pease Air National Guard Base, New Hampshire] over western Estonia and proceeded down-track.'

After a two-day lay-over in Iceland, the flight left on the next leg. Ramos continued: 'We departed Keflavik on September 16. Our tanker launched two minutes behind us and we re-joined just off the coast of Iceland. Our route of

flight took us west and had us overflying Greenland, eastern Canada, and the north-east US en route to Martin State Airport just outside Baltimore, Maryland. We ended up refueling a total of five times and took over 22,000lb of fuel per aircraft. We did our first three refuelings with our Keflavik KC-135s and then rendezvoused with another KC-135 [from the 22nd ARW at McConnell AFB, Kansas] that launched from Bangor Air National Guard Base, Maine. We re-joined near Goose Bay, Canada and we refueled with the 22nd ARW tanker for our last two refuelings. We stayed with it until Nantucket, Massachusetts, at which point they returned back to McConnell AFB and we flew to Martin State, Maryland. We had an uneventful landing after an eight-hour and 35-minute flight.

'Following a long night of sleep, we pushed out of Martin State on September 17 for Whiteman AFB. We were able to refuel in the Buckeye Military Operations Area [MOA] with a KC-135 of the 174th ARS from Sioux City, Iowa. We flew for three hours and 10 minutes, and were finally home.' 🇺🇸





# PATCH WEARERS

The USAF Weapons School is the center of excellence for the world's greatest air force. The school is responsible for teaching the finest instructors, who go on to shape the future of the USAF.

**report:** Jamie Hunter

An F-22 Raptor and F-15C Eagle from the 433rd Weapons Squadron over the Grand Canyon. USAF/MSgt Kevin J. Gruenwald







**W**E ARE A mini-air force! So says Col Michael Drowley, the current commandant of the US Air Force Weapons School at Nellis AFB, Nevada. It out-guns most of the world's air arms in terms of pure numbers alone, notwithstanding the fact that it features the top one per cent of operators and technicians in the USAF, and is composed of its most advanced weapons systems.

Every six months the Weapons School graduates approximately 100 weapons officers and enlisted specialists. They become known colloquially as 'patch-wearers' in light of the coveted uniform patch that marks them out as tactical system experts, weapons instructors and leaders.

The Weapons School consists of 18 Weapons Squadrons (WPS, known as 'Whips') at nine locations across the US. Eleven squadrons are based at Nellis including the 8th WPS (covering the EC-130H, RC-135, E-8C, E-3C, control and reporting centers, battle control centers and advanced weapons directors), 16th

WPS (F-16 and F-35A), 17th WPS (F-15E), 19th WPS (intelligence), 26th WPS (MQ-9), 34th WPS (HH-60G and HC-130J), 57th WPSS (operational support), 66th WPS (A-10 and joint terminal attack controllers), 315th WPS (intercontinental ballistic missile), 328th WPS (space/cyber), and the 433rd WPS (F-15C and F-22). The eight geographically-separated units include the 14th WPS at Hurlburt Field (AC-130, MC-130 and U-28); 29th WPS at Little Rock AFB (C-130) and its detachment at Rosecrans ANGB; 57th WPS at Joint Base McGuire-Dix-Lakehurst (C-17); 77th WPS at Dyess AFB (B-1); 325th WPS at Whiteman AFB (B-2); 340th WPS at Barksdale AFB (B-52); and the 509th WPS at Fairchild AFB (KC-135).

Col Drowley explains: 'The mission of the Weapons School is to produce the lead instructors, the trusted advisors, for the commanders to help raise the level for excellence for everybody within a squadron. We take the top one per cent of the air force and then put them through a demanding five months of academics and platform-specific instruction to







produce the best F-16 weapons officer, the best B-2 weapons officer, cyber and space weapons officer and so on. That really culminates in our integration phase [formerly known as mission employment — ME] where they become USAF weapons officers. They take their platform knowledge and apply it across the spectrum of capabilities. That way, when they get back to their squadrons, not only do they know how to raise the bar for each community, but they also understand their specific platform's importance and role within the [wider] air force and how to best maximize all those capabilities in an operational environment.'

**Above:** The 66th WPS operates the A-10C.

**Jamie Hunter**

**Right:** A pair of GBU-12-toting Weapons School F-15E Strike Eagles taxis out at Nellis.

**Jamie Hunter**

**Right page top to bottom:** Col Michael Drowley (right) is handed command of the Weapons School by Brig Gen Christopher Short, 57th Wing commander.

**USAF**

The 433rd WPS operates the F-15C and the F-22 Raptor.

**Jamie Hunter**

An A-10 pilot by trade, Drowley has a long association with the school and is well aware of its importance at a pivotal time for the USAF. ' [The Weapons School] is particularly critical right now as we look at our adversary environment and some of the threats that are out there. We are at an inflection point of fourth-generation to fifth-generation capabilities within the air force, and we have leaned heavily on our patch-wearers in both real-time operations and to help with this transition [in order to be] ready for our next set of adversaries.'

## TIGHT BUDGETS AND TOUGH TRAINING

Nellis units are no strangers to the effects of a strained budget environment. With the recent disbandment of the 65th Aggressor Squadron and the cancellation of an entire weapons school class in 2013, the need to resource the school and its infrastructure at Nellis cannot be over-



## WEAPONS SCHOOL HISTORY

The Weapons School traces its roots to the Aircraft Gunnery School established in 1949 at Las Vegas Air Force Base, which later became Nellis AFB in 1950. In January 1954, it became the Fighter Weapons School, and by 1960 the F-100 and the F-105 were the two primary aircraft flown by the unit. The FWS added the F-4 in 1965, and as types evolved the F-100 and F-105 courses made way for the F-111 and A-7D. The first USAF aggressors, flying the T-38 and F-5, were

established as part of the school in the early 1970s to improve air-to-air skills by providing accurate threat replication.

With the establishment of Air Combat Command in 1992, the school embarked on a dramatic shift from its 43-year focus exclusively on fighter aviation, and embracing many types across the front line. Also, in 2012, the JTAC Advanced Instructor Course began, which officially became a Weapons Instructor Course in 2015.



*“We put students through an environment that no adversary can really mimic. Whatever the nearest capability is out there, this is 10 times tougher”*

**COL MICHAEL DROWLEY**



emphasized. Col Drowley says: ‘As we come off the back of sequestration, where resources are constrained, our weapons officers go out into the field and they act as a readiness ‘booster shot’ for the air force. We have been running a marathon where our operations are concerned, so we bring that top one per cent here to get them ready for that near-peer adversary, that highly-contested environment which means we are ready for future conflicts.’

Like ‘Red Flag’ exercises, the scenarios at the Weapons School are very challenging, which means that when these mission experts face that future threat, whatever it may be, they are more than ready. ‘We have never lowered the standard from the highly-contested environment,’ says Drowley. ‘We need to be ready for not only an adversary we are looking at right now but for [an] adversary capability almost on steroids. We put students through an environment that no adversary can really mimic. Whatever the nearest capability is out there, this is 10 times tougher.’

Drowley calls the important aggressor force a ‘resource-constrained environment’ right now. He adds: ‘That’s a challenge from two perspectives. We have to generate a lot of our own ‘Red Air’ [aggressors]. We have the 64th AGRS and the 422nd Test and Evaluation Squadron, plus we’ll bring in guest help to provide the numbers, capacity and the capabilities to give us that [threat] presentation. As the adversary becomes more advanced, so do those presentations that we need to fight against, so [it’s] always a challenge to bring a higher level of adversary replication to the Weapons School to allow us to train effectively against those threats.’

The Weapons School runs two classes per year. Explaining just what the students face, Drowley says: ‘We go through a building-block approach. When students show up here they go through core academics, which gets them up to speed on threat capabilities and leadership. They then split off to become the best expert they can on their particular





platform, be it F-15, B-2, intelligence, space, intercontinental ballistic missiles, or so on. The longer they go through the course the more the integration piece starts to build in. They go from blocking and tackling in their own specialties to working more with other platforms and capabilities. When we get to the integration phase — well, that is like a ‘Red Flag’ on a whole different scale [in terms of] the level of complexity in the problem sets they’re going up against and the level of the threats they go up against.’

As the size of the USAF shrinks, multi-role platforms and the effective integration of assets become all the more vital — getting the most from people and equipment, and the ability to work together seamlessly to achieve the desired effect. ‘Integration is the cornerstone of our work here,’ says Drowley. ‘We want to maximize across the spectrum. This is the one place where we can bring a complex problem set, whether it’s dynamic targeting, an advanced SAM [surface-to-air missile] network or a ‘Red Air’ environment, and the only way to successfully navigate it is by integrating all those capabilities successfully. They learn all of that and then take that knowledge back out to the CAF [Combat Air Force].’

## FUTURE FIGHT

All eyes are currently on the USAF’s path to initial operating capability with the F-35A, and the Weapons School is already well into the spin-up of its F-35 course. ‘Right now we have five or six cadre members who are checked out on the F-35, and they are starting to develop those tactics, techniques and procedures which will become the foundation of employment for the F-35,’ Col Drowley says. ‘By the tail end of 2017, that will be our class 17B,

## SPIRIT CLASS

Lt Col Daniel Hoadley is the commander of the 325th Weapons Squadron, the B-2 weapons instructor course. The squadron is based at Whiteman AFB alongside the operational B-2 units, and is one of the eight geographically-separated WPS.

‘We are forcing them outside of their comfort zone and doing things that take them to the next level,’ Lt Col Hoadley says of his B-2 Weapons School students. ‘Specifically on the B-2 side, we initially send them to Nellis for a block of academics — that’s baseline tactical capabilities — before they come back here to Whiteman for another two weeks of B-2-specific graduate-level academics on weapons employment and threats. Typically they then get to employ live weapons on the range, weapons that most guys get to practice from a simulated standpoint but don’t get to employ for real. It’s weapons like JDAM [the Joint Direct Attack Munition], mixed loads of unguided and guided on the same aircraft, full-load weapons employment — it’s definitely a step up from their peers. We don’t have an allocation of training rounds for all of our weapons; for example, the GBU-57 Massive Ordnance Penetrator [MOP] is expensive and limited, [and the] same goes for the 5,000lb GBU-28, but the students execute live employment with a full range of other weapons including nuclear shapes.’

‘Next up is the surface attack tactics [SAT] phase, and we take that basic weapons employment and add realistic threat country employment scenarios, plus we start to have the conversation about integration and a typical employment package for a low-observable [LO] aircraft. That’s all simulated and done locally, but it’s what we consider to be the crucible for a B-2 weapons officer.’

‘Simulator work remains fairly consistent for us. We have 10 simulator rides in our syllabus and we’re getting practice here that we can’t get in the real aircraft. For example, we can force some malfunctions and some threat employment scenarios like an aircraft being shot down, which you wouldn’t see in a live-fly scenario. In future classes I anticipate we will integrate our simulators with others before we live fly at Nellis.’

‘Finally, we move out to Nellis for the integration phase — that’s our live flying employment for a large force exercise. For the B-2 we progress our anti-access training to start with an LO employment scenario involving just us and the F-22s. Then we move onto deliberate strike night, where we add more players. It all culminates in the offensive counter-air SAT mission, which is a 60-aircraft LFE, tackling the graduate-level threat. We make it as difficult as we can for them without being ridiculous!’





[and] that cadre will validate the syllabus that the students will go through.' Indeed, Class 18A is when the first students will go through the F-35 Weapons School course.

'We were able,' Drowley continues, 'to capture and employ a lot of the lessons learned when we stood up the F-22 WIC [weapons instructor course — spoken as 'wick'] and we are applying that to the F-35. We have the best F-16 patch-wearers, the best A-10 patch-wearers and the best Strike Eagle patch-wearers all coming together to make up that core cadre of instructors on the F-35 and the momentum is starting to build. They are becoming familiar with basic level employment [of the F-35], and they can build on that foundation and put us on a timeline to get those first students graduated in 2018.'

At present, the F-35s are operated by the 16th WPS — the school's F-16 element — but they will split off to form their own squadron. Drowley says: 'We want that squadron to have its own identity, culture and expertise, plus it's going to be a very large squadron, as the F-16 WPS will also be. We'll have 24-26 jets between the two squadrons.'

The relationship between particular communities is reflected in the way some of the Weapons School units work together. 'There's a very special relationship between all the squadrons,' says Drowley, 'but in particular the F-15C and F-22 WICs both fall under the same squadron — the 433rd WPS. Just by the nature of that they have a close relationship in terms of fighter integration. The fighter mix is critical and we train to that. We have never got away from training to the full spectrum, from the BVR [beyond visual range] fight to the [close-in] 'knife fight'. We want to maximize our capability to stand off, but it's also about how we survive and dominate if we get into a visual turning fight.'

Of course, it's not just about the fighters. The wider range of capabilities are all well-represented within the modern structure of the school. 'Our 8th WPS is our air battle managers, the AWACS, Rivet Joint and EC-130 guys, for example. We also provide patch-wearers for the MQ-9, HH-60 and A-10 communities. It's our patch-wearers that allow the USAF to evolve. That's a tremendous responsibility and it's why our mission is so critical. They are the ones at the tip of the spear, leading the air force in the direction it needs to go. The problems are only getting harder, and we are always asking our patch-wearers to solve them.' 



**Left top to bottom:** The F-35 weapons instructor course will kick off in 2018. **USAF**

Patch-wearers are revered throughout the air force as the experts and leaders.

**USAF/SrA Brett Clashman**

**Above:** An A-10C pilot gets into the action, delivering live weapons during the course. **USAF/SrA Brett Clashman**

**Left page:** Joint terminal attack controllers are now an important part of the Weapons School course. **USAF/TSgt Michael Holzworth**





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# LIGHTNING PROGRESS

As the capabilities of the USAF's latest fighter continue to expand, the 33rd Fighter Wing at Eglin Air Force Base, Florida and the 56th FW at Luke AFB, Arizona have joint responsibilities as centers of excellence for F-35A Lightning II pilot training.

**report:** Jamie Hunter

**B**RINGING A NEW fighter aircraft into service is a complex process. When it's a type with three major variants, plus a host of domestic and international operators, it makes the operation even more challenging. For the US Air Force, the advent of the F-35A Lightning II has been eagerly awaited. The aircraft is never far from controversy, especially in light of the remit of 'concurrency', under which the aircraft has been brought into service before it reaches maturity.

Setting the ship on the right course and training the men and women who will fly and fight in the F-35 fell first to a joint training center at Eglin AFB, Florida, where the USAF, Navy and Marine Corps formed initial training units to set the ball rolling. Eglin was originally envisaged as something of an F-35 training hub for the three US armed services as well as international partners. The original vision was that all pilot training would be performed here by the 33rd Fighter Wing. However, when an environmental impact study limited the base to just 59 F-35s, things changed.

The Marine Corps has already split off its training unit, Marine Fighter Attack Training Squadron (VMFAT) 501, to home turf at Marine Corps Air Station Beaufort, South Carolina. The Navy's F-35Cs with Strike Fighter Squadron (VFA) 101 may follow suit, but there are no plans at this time. However, Eglin's 33rd FW continues its important mission for the USAF, and a second F-35 training hub is now spinning up at Luke AFB in Arizona.

Air Education and Training Command's 58th Fighter Squadron, the 'Gorillas', at Eglin was the pioneering unit for training the first USAF F-35 instructors. This work continues today as the squadron helps seed the rapidly-expanding F-35 community.

The 'Gorillas' were formed on October 1, 2009, and the unit's first F-35A (serial 07-0747/AF-09) reached Eglin on July 14, 2011. A formal announcement of the start of instruction of new F-35A pilots was made on December 17, 2012.

The basic premise of establishing the initial F-35 cadre involved experienced pilots being drawn from other fighter aircraft communities in the USAF. This is

a somewhat unsurprising approach, since the F-35 does a lot of things differently, not least its reliance on helmet-mounted display technology instead of the traditional head-up display (HUD). It uses a distributed aperture system (DAS), a set of infra-red (IR) cameras to help the pilot monitor the outside environment visually, and it relies on advanced data networks such as the Multi-function Advanced Data Link (MADL) to talk to its comrades and maintain a high level of situational awareness.

Col Christopher Niemi is the commander of the 33rd Operations Group. A seasoned F-15E and F-22 pilot, few are better-qualified to provide an overview and evaluation of the F-35 training program. Speaking of his time flying the F-22, Niemi comments: 'It was very helpful coming into this community'. He'd been flying the F-35 for 17 months at the time of our meeting and was frank about the challenges that face his team at Eglin on a daily basis, not least those presented

'Ringo' break — callsign 'Ringo', these two 58th Fighter Squadron F-35As, led by Maj Michael Emerson, break dramatically for the camera. **Jamie Hunter**







by the concurrency issue. 'I didn't know anything about the F-35 before I came here... there's a lot of similarity [with the F-22] but also some significant differences. One of the big differences is that we live day-to-day with the consequences of concurrency. When we work to figure out what we will teach our F-35 student pilots, we have to factor in things like the tactics we are going to teach here, because these are still developing.'

Things move fast in the F-35 program, and that's a huge challenge for the training community. 'What are the capabilities I'm actually going to have in the aeroplane?' Niemi questions. 'What am I going to have as the next software tape comes down? It's good work but it's dynamic and it's not as static as most fighter training units where you're teaching someone to fly an F-16, for example, that we've been flying for 30 years. Those are much more mature weapons platforms.'

Most of the jets on the line at Eglin are now upgraded to Block 2B-standard software, and a 2B syllabus to match is planned to commence next spring. New USAF pilots are currently taught to the Block 2A-standard syllabus. They're therefore flying F-35As with more capability than the syllabus they're training with. The plan is for both the Eglin and Luke training programs to jump from the 2A standard to the 2B syllabus in early 2016. Niemi says: 'We had to wait until we got all of our jets upgraded, or at least enough of them, in order to train the instructor pilots and figure out what we're going to incorporate with the new capabilities into that 2B syllabus. We need to fill in the meat on those bones to provide the specificity so an instructor can actually go out and teach it — that's what we're going through right now, so that when we put the first student through the 2B syllabus, even though they'll be flying the same jet that students are currently

flying, it'll be an expanded syllabus that makes the most of those opportunities. We just need a little bit of time to get up and running on that.'

## PARALLEL TRAINING

The change of plans for Eglin has resulted in some of the additional USAF and international training requirement being soaked up by the 56th FW at Luke AFB, Arizona. The courses run by the 33rd and 56th FWs are essentially running in parallel, although initial maintainer training is conducted at Eglin, under the 82nd Training Wing.

The initial cadre from Eglin has now fanned out across the USAF F-35 world. Many of these pilots populate the two squadrons at Luke, as well as the operational test community and the first front-line squadron at Hill AFB, Utah. Teaching brand-new pilots straight out of flight school is some way off, so the locker rooms at both Eglin and Luke feature names from around the A-10, F-15 and F-16 communities, as well as from the F-22.

The current Block 2A-standard training was written for experienced flyers. It broadly involves 210 hours of classroom training and 14 flights in the advanced F-35 simulators — the Eglin simulator incorporates a 360-degree visual display. As to what these students can expect when they arrive for F-35A training, Col Niemi says: 'It's a building-block approach. They do the academics first, where we teach them what they need to know as a pilot about the hydraulics system, the avionics, the way that they interface with the jet, and then we build on that to go to the EPs [emergency procedures] and we reinforce those lessons in the simulator'. The advent of the F-35 has placed more emphasis on simulator work than ever before, due to fidelity, aircraft availability and the sheer capability of the fighter itself. The majority of a new pilot's early simulator 'flights' are

**Right:** The cockpit of the F-35 is dominated by a single, large, flat-panel touch-screen display.  
**Jim Haseltine**

**Below left to right:** Ready to step from the 58th FS ops desk.  
**Jamie Hunter**

Col Christopher Niemi performs the walk-round checks on an F-35 at Eglin.  
**Jamie Hunter**

This former A-10 pilot is a student on the F-35A course at Eglin.  
**Jamie Hunter**

Climbing aboard an F-35A at the 58th FS.  
**Jamie Hunter**











dedicated to handling the range of EPs. A desktop trainer is used to master the art of changing radio frequencies and handling the large-area cockpit display. It all culminates in an EP simulator check ride before they get let loose on the actual aircraft, to give both the instructors and the new pilot the confidence that they are fully equipped to handle any emergencies that may happen on that first sortie, since there are no two-seater F-35s.

Col Niemi explains the pilot's first live flight in the F-35. 'On the first flight the real

goal is to safely start the aeroplane, take off and land it. We introduce them to more elements, but that's what we're really trying to do because it's the first time they will have done everything end-to-end. You go through the mission brief, signing out the jet in ALIS [the autonomic logistics information system], putting on the life support equipment, strapping into the jet, etc. There's a lot of things that are just new and different on that first sortie. So, we get that all out of the way and taxi out. We do an airborne pick-up; we don't want him

to be by himself. The instructor takes off and comes around and picks the student up as he gets airborne. They then fly out to the airspace — the student gets a feel for the jet, doing some handling, and puts the undercarriage down for some circuit pattern work at altitude. They come back for a straight-in overhead pattern — they also practice the flame-out pattern. If on sortie two they have a serious engine malfunction they need to be able to come back and glide in from that pattern.

'The first four sorties are dedicated to handling and instruments, with ride four being the instruments check ride. We start to fly the jet tactically from the fifth flight onwards. On the fifth flight, the pilot employs the radar in the air-to-air mode, simulating the use of the AIM-120 AMRAAM missile. On the sixth, the pilot uses the radar for simulated air-to-surface work, simulating the use of the 500lb GBU-12 laser-guided bomb.'

**Above left to right:**

Col Christopher Niemi is the 33rd Operations Group commander at Eglin AFB. **Jamie Hunter**

A 'Gorillas' F-35 taxis out for a morning mission at Eglin AFB. **Jamie Hunter**

**Left:** The F-35's single Pratt & Whitney F135-PW-100 two-stage turbofan engine, with a thrust rating of around 28,000lb (125kN), rose to fame at Eglin when a unit failed in 2014. **Jamie Hunter**





*“The F-35 was optimized, if anything, to go into a high-threat environment with advanced surface-to-air missile systems and use very advanced air-to-surface sensors to find targets and kill them. It will do that fantastically”*

**COL  
CHRISTOPHER  
NIEMI**



## LUKE TRAINERS

So many USAF fighter pilots have had their first taste of flying a front-line, high-performance, F-series jet fighter at Luke AFB. In recent years, active-duty trainee pilots and engineers destined for the air force's numerous F-16 units will have spent a good portion of time at this base, located adjacent to Phoenix. The hot, dry climate, dual runways and nearby ranges make it ideal for flying training. A decade ago, Luke was humming with F-16s — type conversion squadrons, night-attack training squadrons, and forward air control — airborne (FAC-A) specialist training squadrons were all here. But even the mighty F-16 is getting long in the tooth by USAF standards. As older Block models have been retired or passed down to allied air forces, the F-16 training burden has eased considerably.

Given this place's heritage and track record, it was little wonder that the USAF wanted Luke to be a major player when it came to the F-35A. The resident 56th FW has been earmarked to host up to 144 F-35As, making it an essential cog in the works to fulfill the USAF's ambition of forming its first front-line unit of F-35As in August 2016. The 56th FW is not only about building the pilot cadre for the

USAF. It is also the hub for training international F-35A partners — with the first class joining this formal training unit at Luke in May 2015, things are really moving fast.

The first F-35A arrived at the Arizona base on March 10, 2014 and a pair of Royal Australian Air Force (RAAF) jets are also now in residence. Brig Gen Scott Pleus, the 56th FW commander and a seasoned F-16 pilot with 20-plus years of experience of flying single-seat fighters, became the first USAF pilot to switch to the F-35 at Luke as he commenced the flying portion of his upgrade training to join the base's F-35A instructor cadre. 'It's important that I complete my flying training here with our airmen, in our airspace, so I can help refine and validate our program,' says Pleus. 'The F-35 is going to be the backbone of the air force's fighter fleet for decades to come and Luke will play a vital role in producing the world's greatest, most lethal F-35 pilots.'

The 'new' pilots arriving at Luke are also cross-over pilots: fairly experienced fighter pilots, hand-picked and coming to the Lightning from their previous fighter mounts. These airmen are now joining the ranks of the 61st Fighter Squadron 'Top Dogs' — the 56th FW's first F-35A unit —

and the 62nd FS 'Spike.' Australian, Norwegian and Italian pilots are all now being trained here. A third squadron is planned to form at Luke in 2017, and the steady march onwards continues.

Lt Col Gregory 'Merc' Frana started his F-35 journey at Eglin with the 58th FS 'Gorillas,' before moving across to Luke to act as the director of operations (DO) at the 61st FS before taking command of the 62nd FS. As an experienced F-15E pilot, Frana was selected for the F-35 program early to enter training as an initial instructor pilot, and started his conversion to the new jet at Eglin in January 2013. 'I was selected as one of the initial cadre [of USAF pilots] to fly the F-35. I flew it at Eglin for about six months before I came out to Luke.'

Now well-established at the Arizona base, Frana is a key figure in the team establishing this latest F-35 training hub. 'Our primary focus right now is training credible F-35 instructor pilots. Part of the challenge is that the aircraft has only been around for a few years, and so we are getting instructors that are very new to the airplane. Initial instructors have shown up here with only 15 hours flying time on the jet. We are currently focusing on that instructor pilot credibility and I look on

**Left:** Eglin's Lightnings regularly operate high over the ranges above the Gulf of Mexico, off the Florida coast.  
**Jamie Hunter**

**Above:** A pair of 61st Fighter Squadron F-35As leads the first two Royal Australian Air Force examples over the Grand Canyon in February.  
**Jim Haseltine**





that as being three key things: proficiency, which means actually flying the airplane on a regular basis; experience, building that proficiency and gaining hours and generally becoming comfortable in the F-35; [and] lastly, we have overall knowledge of the jet. We have a fairly robust academic program where we teach each other twice a week so that collectively we are becoming better-prepared for student training. All of the pilots coming to Luke currently have been instructors on a previous platform, so we generally have a mix of former A-10, F-15E and F-16 IPs here right now.'

The first formal class that started at Luke in May accommodates two types of student. Some are F-35 instructor pilot (IP) upgrades, taking a pilot who was an instructor on another fighter type and converting them to become an F-35 IP. In addition, there will be 'transition students,' experienced non-IPs coming across to the F-35 from a previous tour, and with around 750 hours under their belts. They will seed the wider F-35 force, but not necessarily as instructors. As for brand-new ab initio F-35 pilots, the seniors could see the first young students out of flight school in 2017, but dates are still being finalized.

Unlike the previous format of specific F-16 squadrons teaching specific trades, the F-35 plan at Luke will involve each unit teaching the same syllabus, from the first take-off to full-up surface attack tactics (SAT). 'We are keeping an intense focus on flying operations,' says Frana. 'This is to help mitigate against outside pressures by way of focusing on the importance of flying.'

One of the major issues facing F-35 training squadrons to date has been the

availability of aircraft with sufficiently mature software to allow meaningful training. This situation is very different now compared with the early training set-up at Eglin in mid-2011, when pilots started out with the basic Block 1A software. Back then some pilots referred to the mission systems as being 'extremely immature.' Frana comments: 'The effectiveness of our training has increased dramatically. We are in a good spot now and we have come a long way.'

He added: 'We are flying the Block 2B and 3i software right now and we are doing as much as we can with the flight envelope that we have. For example, our flying schedule this morning is for some 4-v-2 work, so we're going out to do a basic SAT profile against two simulated Red Air fighters and attacking targets that they are defending. I flew a close air support [CAS] sortie two days ago. We have the ability to employ simulated GBU-12 and GBU-31 [Joint Direct Attack Munition, JDAM] weapons right now, so we have the air-to-surface work, plus we are also flying tactical intercepts, which are currently primarily 2-v-2 set-ups from a tactical perspective.' The Block 2B training will open up the envelope for more conventional tactics and missions such as BFM (basic fighter maneuvers), ACM (air combat maneuvering), TI (tactical intercepts), and SEAD (suppression of enemy air defenses).

Pilots stepping across to the F-35 at Luke are receiving the 2A syllabus. This course is heavily supported by simulator work, as one would expect in the modern era. The live flying at present involves just seven flights plus three optional extra flights, based on previous experience. Following trip four, the instrument check, Frana says:

'They then fly one basic SAT mission and a tactical intercept ride, culminating with a single check ride. That's how it looks right now based on capability.' The three optional flights depend on their background. 'They consist of one night flight, one CAS and one 1-v-1 intercept. For example, if they are transitioning in from the F-15C they might add on the CAS sortie, or if they are coming from the A-10 they might pick up the tactical intercept sortie.'

'It's important to understand how short the course is,' continues Frana. 'Air Education and Training Command has looked carefully at the stand-up of F-35 operations and how quickly we can push students through in order to make them a productive member of the F-35 community.'

## FLYING THE F-35

'Honestly, I was surprised at how easy the transition was from the F-15E to the F-35,' Frana enthuses. 'Both are easy to fly. There's a lot of autopilot and auto-throttle functionality in the F-35, so generally take-off and landing is easy. The major difference is the mission systems capability and computing capacity of the F-35 — its ability to detect, sort and present information to the pilot. That's what takes a bit of time, and this is where we are building our instructor knowledge about how this system of complex systems works day in and day out and how to best tactically employ that.'

'The F-15E is mechanized differently from the F-35 just through the manner in which you interface with the jet. In the F-15E most of the systems were managed by the WSO [weapon systems officer], whereas in the F-35 most of these types of

**Above left to right:** As well as pilots, maintainers receive their training on the F-35 at Luke AFB.

The course at Luke is currently geared towards instructor pilots crossing to the F-35A from other types.

**Jim Haseltine**

Touchdown — back on Luke's runway.

**Jim Haseltine**

**Right:** Turning finals. New Lightning II pilots have just four flights to get to grips with the F-35 before they start working on the tactical elements of the course.

**Jim Haseltine**





things are automated. For the F-15E, as well as most fourth-generation fighters, you had to look at systems individually, be that for example the radar, the targeting pod or the radar warning receiver [RWR]. The sensor fusion [of the F-35] means that it is a 'system of systems' and all these systems are automated into one useable format.'

Despite the advances brought about by the F-35, there are clearly some frustrations. Instructors are still wearing the 'Gen 2' helmet, but the 'Gen 3' version has received flight clearance. Restrictions put in place following the catastrophic engine fire at Eglin last year that led to the lengthy grounding of the Lightning II fleet have been lifted. Frana and his F-35 colleagues are now pulling up to 5.5g, and some aircraft as much as 7g. A number are cleared to fly at Mach 1.6.

Lt Col Michael Gette is the commander of the 61st FS. He began his transition from the F-15E to the F-35 at Eglin in 2010. Gette confirmed that the first ab initio pilots could go to either Eglin or Luke, but dates are still not set in concrete. 'We are working on that syllabus right now and we expect to have that complete by the fall of 2016 to be ready to teach guys coming straight out of pilot training,' he states. Gette's squadron is fully established with 25 F-35As, including the two RAAF jets. 'The 61st FS is a combined USAF/ RAAF unit. The 62nd FS will take the Norwegian and Italian instructors and aircraft.'

On the subject of his unit's current activities, Gette says: 'Our flying right now involves a lot of basic surface attack [SA], basic air-to-air intercepts, SEAD, CAS, and opposed SAT, the latter being opposed ingress into a target area with simulated

*'This aircraft has an innate capability as a SEAD platform, so we are going to add that into our syllabus and that will shift us to more of an air-to-ground focus. That said, our pilots are going to be trained in the air-to-air role'*

**LT COL MICHAEL GETTE**





enemy aircraft. We fight our way in, drop a simulated weapon and then fight our way back out. This aircraft has an innate capability as a SEAD platform, so we are going to add that into our syllabus and that will shift us to more of an air-to-ground focus. That said, our pilots are going to be trained in the air-to-air [role].'

As if to further illustrate the complexities of concurrency and how this impacts upon the training squadrons, Lt Col Gette's jets are a mix of Block 2B and 3i-standard aircraft. 'We are in the process of developing that next syllabus,' he says. 'It will take advantage of the things the aircraft can do now that it couldn't do when the last syllabus was written.'

## MATURITY

Clearly, the maturity of the F-35 presents something of a rolling issue for the trainers. Improvements to the aircraft standard are happening relatively quickly. For example, night flying was a limitation in early-standard jets, but, as Col Niemi explains, that is no longer the case. 'Block 2A was the first software standard to allow us to fly at night. We do one night mission now where the student looks at the external lights, the cockpit displays, and at our DAS, which is essentially an infra-red globe around the aircraft [...] projected into the helmet. With the Gen 2 helmet and with 2B software we can also start using the night vision camera [in the helmet], but the camera in Gen 3 is better. At the flip of a switch I can now go from flying in the day with a JHMCS [Joint Helmet-Mounted Cueing System]-like capability to night flying with an NVG-type capability.'

'The upgrades and capabilities are coming fairly quickly, and that's exciting,

but it's something of a challenge to keep up in terms of the syllabi and what we're going to teach. For example, the 2B software that we're flying now is the first time we are able to share tracks between the aeroplanes for tactical targeting, so if you see an air track I see that same air track and now we can engage co-operatively on it. That opens the door to new tactics and new things we need to teach the students. They're all part of the game plan as we roll towards IOC [initial operating capability], then onwards towards Block 3F and Block 4.'

Niemi expects to see new pilots straight out of training some time between IOC and the advent of the Block 3F software standard. 'The types of things we're considering draw on our past experience with the F-22. It's important to normalize your manning, so we need to bring in young lieutenants as early as we can in order to fill out the squadron manning appropriately — who is going to lead our squadrons in 2030, for example? The more experience those individuals have, the better-equipped they'll be to handle those challenges when they get there.'

'At the same time, because the aeroplane is still maturing and because our training systems and syllabi are still maturing, we have to tailor that to make sure we're ready. It's an easy airplane to fly, but much like any other aeroplane there are plenty of ways to get yourself into trouble as a young, relatively inexperienced pilot.'

'What I do worry about a little bit is the airmanship. It wasn't uncommon with a young F-22 pilot to absolutely slay the adversaries in the simulated scenario that we were operating in but then come back and allow his fuel to get too low, because he didn't have that sense that it

was a real aeroplane. Although we're shooting fake missiles, you can run out of real gas.'

## FIGHTER TALK — A CHANGE IN RHETORIC?

In December 2013, USAF chief Gen Mark Welsh commented on the USAF's air superiority fighter 'mass'. He said that the F-22 Raptor was meant to provide theater-wide air superiority. But with too few F-22s to provide this umbrella, he said the F-35s will be heavily tasked with air-to-air responsibilities. 'You have to have the F-35 to augment the F-22 to do the air superiority fight at the beginning of a high-end conflict to survive against the fifth-generation threats we believe will be in the world at that point in time,' Welsh said. He added that he is not willing to go to his bosses in the Pentagon 'and say, 'I would recommend we keep our old equipment and update it and just accept more losses and count on the incredible ability of our aviators to win the fight anyway'. Now, the rhetoric has changed somewhat, toward the retention of the F-15C Eagle to help supplement the F-22s. Boeing's F-15 2040C drive would appear to endorse this, and current plans call for the Eagle to remain in USAF service until around 2043.

Coupled with the argument over the CAS role for the F-35 and the planned retirement of the A-10, does this signal a shift in the way the USAF plans to operate the F-35?

Col Niemi says: '[The F-35] is more like the F-22 than anything else the USAF is flying. The things you will do in an F-35, based on what I've seen, in many ways are going to look like what we do in an F-22. The F-22 was designed and

Four-ship tactics came into the spotlight recently over issues with the F-35's datalink and ability to discriminate targets within a formation.  
**Jim Haseltine**







optimized for the air-to-air mission and it can employ a JDAM very effectively, particularly in a high-threat environment. The F-35 is the mirror image of that. The majority of its capabilities are focused on the air-to-ground mission — it's going to be a great SEAD aircraft, very good at going into high-threat areas and attacking a target, plus flying CAS and all the air-to-ground missions... It can also do air-to-air but it wasn't primarily designed to do air-to-air. We are going to use the F-35 for more air-to-air than we originally planned because we weren't able to acquire sufficient numbers of F-22s.

'The conversation has focused quite a bit on the CAS mission. The F-35 was designed with the CAS mission in mind, but it wasn't optimized for CAS. It was optimized, if anything, to go into a high-threat environment with advanced surface-to-air missile systems and use very advanced air-to-surface sensors to find targets and kill them. It will do that fantastically. It can also go and do CAS. There are a lot of airplanes that can do CAS in a low-threat environment. The A-10 happens to be probably the best at it based on the number of weapons it can carry, its legs, and things like that. But the F-35 can do things that an F-16 can't do, [and] an A-10 can't do, because they simply aren't survivable based on the threats that we see as we go forward.'

Much recent talk has focused on the air-to-air capabilities of the F-35. A leaked report into a within visual range (WVR) engagement between an F-16 and an early F-35A in testing drew criticism when the F-16 appeared to maintain the upper hand in the dogfight. Niemi comments: 'As a fighter pilot, if you ask me 'would I rather have a 7g aeroplane or a 9g aeroplane', I don't have to think for long about it before I say 9g. But that's not the question. The

question is, would you rather have 7g and this capability or would you rather have 9g and give up that capability. When we look at those real-world trade-offs I think we're making good decisions, but sometimes that gets lost in the discussion because the assumption is that we just gave up 9g to 7g for no gain. In every one of those cases it is a real gain that was based on the capability that's going to be most useful. You weigh all that together and then you prioritize.

'When you look at the macro trend over the past 40 years, the number of dogfights

involving post-merge maneuvering has greatly diminished. Even in the F-22, which is a tremendous dogfighter, the great majority of engagements in an LFE [large-force exercise] like 'Red Flag' weren't decided after an F-22 turned for 720 degrees and finally beat an inferior-turning airplane. They were decided two miles from the merge where the guy didn't even know the F-22 was there and he shot him in the lips! I'm very comfortable with the F-35's capabilities for air-to-air combat. I think we're going to continue to see the macro trends point towards less post-merge maneuvering and towards the importance of stealth, so they don't know you're there, and the importance of highly maneuverable missiles like the AIM-9X.

'It's fun and useful to train a fighter pilot to maneuver their jet from a neutral merge so they can gun-track an adversary, but the utility of that, even in an F-15 or F-16, is being steadily undermined by advances in missiles. The last thing you want to do is anchor with an adversary in air-to-air combat, because it makes you vulnerable to getting popped by his wingman or someone else that's stumbled across your furball.' 🇺🇸



**Above:** A 61st FS F-35A flies over the Grand Canyon on a mission from its home station at Luke AFB.

**Jim Haseltine**

**Right:** 'Gorilla' F-35s formate on the cameraship in October 2015.

**Jamie Hunter**



**T**HE USAF'S THREE strategic bomber types are key factors that discriminate this air arm from its sister services. The Rockwell B-1B Lancer, sometimes known affectionately as the 'Bone' (B-One), is the only one of the trio limited to conventional bombing, having given up the nuclear strike role in 1992 as part of the arms treaty with the former Soviet Union. The 7th and 28th Bomb Wings, respectively based at Dyess AFB, Texas, and Ellsworth AFB, South Dakota, are the two principal operators of the type, having been re-assigned from Air Combat Command's 12th Air Force to Air Force Global Strike Command's Eighth Air Force on October 1, 2015. The move

aligns all USAF strategic bombers under a single command, and involves the 62 in-service B-1s and some 7,000 personnel.

The B-1B became operational back in 1986. It was designed as a low-altitude supersonic bomber, with relatively low radar cross-section, variable-geometry wings, advanced avionics for its time and afterburning engines that made it sleeker and faster than the B-52, and therefore less vulnerable to enemy surface-to-air missiles and fighter aircraft.

But the end of the Cold War left the B-1 searching for a new mission. The protracted Conventional Mission Upgrade Program (CMUP) gradually transformed the B-1B into a bomber capable of

employing the latest in conventional weapons, to include Global Positioning System (GPS)-guided Joint Directed Attack Munitions (JDAM) and long-range stand-off Joint Air-to-Surface Stand-off Missiles (JASSM). The B-1B has the largest internal payload of any current bomber. However, many of its systems are original equipment and suffer from diminishing manufacturing sources and material shortfalls that impact reliability, availability, and maintainability. In addition, to mitigate against fatigue, the jet is now limited to subsonic flight.

Of the 100 B-1Bs built, the 62 in service are split between Dyess AFB, with 35 aircraft, and Ellsworth AFB with 27.

A fine view of a Dyess-based B-1B complete with Sniper targeting pod under the forward fuselage.  
**Jim Haseltine**





The Lancer's diverse capabilities and large, precision-guided payload, its good range, high subsonic speed and long endurance have helped carve out a name for the type as an excellent if somewhat unexpected close air support (CAS) platform. With a planned out-of-service date of 2040, a range of upgrades are keeping the aircraft relevant and credible.

Col Justin Boldenow, an experienced B-1 weapons systems officer, is the current 7th Operations Group commander at Dyess AFB. He told the Yearbook: 'I honestly feel that the B-1 is the most efficient and effective bomber in the US Air Force inventory.'

With 18 years' experience down in the back end of the Lancer's cockpit, he's grown understandably attached to this charismatic swing-wing heavyweight. 'We have a long history of operations with Operation 'Enduring Freedom', Operation 'Iraqi Freedom', and now with 'Freedom Sentinel' and 'Inherent Resolve'.

Boldenow attributes the bomber's continued demand from combatant commanders to the fact that 'we carry a lot of fuel and munitions'. In his estimation, the B-1 has become 'the platform of choice for an evolving situation on a day-to-day and sometimes an hour-to-hour basis because of our loiter time and munitions.'

## HOME ON THE RANGE

Dyess is home to the 28th Bomb Squadron, which is the B-1 schoolhouse, along with the operational 9th Bomb Squadron. The 77th Weapons Squadron — the USAF Weapons School-associated unit — is here too, as is the 337th Test and Evaluation Squadron (TES), which evaluates new kit for the B-1 emerging from developmental flight testing. That kit has been coming thick and fast in recent years. B-1 crews are now up and running with Global Air Traffic Management (GATM) compatibility, UHF satellite communication and, significantly, the Link 16 NATO-standard datalink. The first B-1 Fully Integrated Data Link (FIDL)



# LANCER GOES GLOBAL

On October 1 the USAF's B-1B bomber force joined Air Force Global Strike Command, cementing its presence alongside the B-2 and B-52, and presenting the ultimate strategic bomber force.

**report:** Jamie Hunter





set-up started flight trials in 2009 with the 419th FLTS at Edwards AFB, California. Sustainment Block 14B heralded a laptop-controlled targeting pod upgrade that allows the bomber's crew to target using the laser on the Sniper pod, and lots more is coming. The latest is Sustainment Block 16 and the so-called Integrated Battle Station (IBS), a comprehensive cockpit and operator station upgrade.

Col Boldenow is well-acquainted with Block 16 and all that it adds to the B-1. 'Block 16 is the biggest software and hardware change to the B-1 that we've made since it was produced 30 years ago,' he enthuses. 'Many of the displays, particularly for our WSOs, are changing from monochrome to color. [There are] additional ways to interface with the software in the aircraft through either the traditional avionics flight software menus or through the IBS software menus, with a drive towards a Windows-based interface.'

The IBS upgrade brings with it a pair of new multi-function displays with digital flight instruments and color moving maps for the pilots. It provides the twin WSO work stations with five new color displays featuring similar map and sensor displays via the vertical situation displays upgrade (VSDU) and a central integrated test

*'When I first came to the B-1 we were flying Block C aircraft. I did my job as a WSO by listening to the radios, getting threat calls via bearing, range, altitude and azimuth and plotting them on my paper map'*

**COL JUSTIN BOLDENOW**





system (CITS), along with new keyboards and controllers. FIDL will connect the B-1 into Link 16 networks and allow the aircraft to send and receive text messages, imagery and mission assignments such as external targeting information. Now development testing is complete, the initial production Block 16 aircraft (serial 86-0122) arrived at Dyess in January 2014 for evaluation by the resident 337th TES.

‘Sustainment Block 16 has been in progress for quite some time,’ says Boldenow. ‘We’ve actually received 10 aircraft back from the modification line at Tinker AFB to date. The capability is going to the operational units first and our training unit will continue to train with their Block 15 aircraft. It will fall to the operational units to spin up our aviators on Block 16.’

The upgrade brings about a serious improvement in situational awareness (SA) for the B-1 crew. Boldenow comments: ‘When I first came to the B-1 we were flying Block C aircraft. I did my job as a WSO by listening to the radios, getting threat calls via bearing, range, altitude and azimuth and plotting them on my paper map in the back. Everyone built their SA that way. Now the MFDs give us a color moving map, [and] the Link-16 airborne network connects us with the ground forces and other airborne players, so we can trade information back and forth through data rather than through voice.’

## DOWN-RANGE AND FUTURE FIGHTS

The Ellsworth AFB squadrons have been busy in 2015 with operational



deployments in the Central Command area of responsibility. The Yearbook had the opportunity to talk to Ryan, a B-1 pilot from Ellsworth’s 34th Bomb Squadron. ‘We returned at the end of July from an ‘Inherent Resolve’ and ‘Freedom Sentinel’ deployment and down there we were flying pretty much all CAS. We are always talking to a coalition JTAC [Joint Terminal Attack Controller] so we get our targets from them. The good thing in the B-1 is that we have four guys in the crew double-checking information and coordination with the JTAC.’

The USAF has yet to deploy B-1s with the IBS upgrade on operations, so it is still up to the crews to use the existing systems in the cockpit. Ryan explains: ‘We have our laptops, one in the front and one in the back, and so we can plot data on the Falcon View system that we have on those. We can use the information from the JTAC such as the traditional nine-line brief for

a target and share it front and aft in the cockpit via the aircraft’s internal network. We also worked with other platforms such as the MQ-9 Reapers and they are able to designate targets for us.’

B-1 crews have learned to rely heavily on their Sniper targeting pods. ‘The targeting pod display will show up on the WSO’s laptop and we can connect into that to see what they are seeing,’ says Ryan. His squadron’s recent deployment saw it mainly employing Joint Direct Attack Munitions (JDAMs): 2,000lb GBU-31s, 500lb GBU-38s and GBU-54 laser JDAM.

Now back from deployment, Ryan’s squadron has set its focus on the wider remit of B-1 missions like longer-duration global power sorties, as well as the future and the push to be prepared for the high-end, near-peer fight. ‘One week we will focus on global power, the next it might be other mission sets. Every sortie will train to that week’s mission. Last week we focused on stand-off weapons training, flying three-to-four-hour missions and simulating using the AGM-158 JASSM [Joint Air-to-Surface Stand-off Missile].’

Near-peer adversary training is something of which Col Boldenow is well aware at Dyess. ‘It has been a focus area since I took command of the Operations Group here in June. It’s one of those delicate balances between what combatant commanders are asking of us currently and what we have to be ready to do against a near-peer adversary.’ Fortunately, by focusing on the larger threat-type scenarios, training and currency usually embrace the tasks being

**Top left:** The 337th Test and Evaluation Squadron at Dyess is responsible for operational test work with new equipment for the B-1. **Jim Haseltine**

**Top:** Col Justin Boldenow, 7th Operations Group commander. **USAF**

**Below left to right:** A Weapons School graduate B-1B pilot ‘in the office’. Note the laptop with Falcon View system installed. **Jim Haseltine**

The new Integrated Battle Station front cockpit layout. **USAF**

One of the two Weapons System Officer Integrated Battle Station consoles. **USAF**







asked of the B-1 units. 'By looking further out to determine what we need to be training for, it actually means we cover many of the mission sets the combatant commanders are asking us to do today.'

The B-1's internal weapons bays accommodate an impressive host of weapons. Boldenow says: 'The primary weapon of choice is the GBU-31. We have a couple of variants of those including the hard-target (V)3 version. We just went through a 'Combat Hammer' WSEP [Weapons System Evaluation Program] on the JASSM from an operational B-1,

which is part of the process of taking that into the operational inventory. GBU-54 is the first laser-guided bomb we have carried, plus the [GBU-53] SDB [Small Diameter Bomb] II is being worked.'

Further to this, the Lancer community has a secondary maritime strike mission to perform. The 337th TES conducted the first ever test of the B-1's capabilities in that role on September 15, 2011, when it delivered 10 JDAMs against remotely-controlled High-Speed Maneuverable Surface Targets on a test range in the Gulf of Mexico. The weapons included two

GBU-54s, six GBU-38s and two 2,000lb GPS-guided GBU-31s, as well as a single 2,000lb unguided BDU-56. The B-1 has also tested a prototype Long-Range Anti-Ship Missile (LRASM), a derivative of the JASSM.

## LOW-LEVEL

'The USAF is interested in maintaining our low-level flying capability,' reports Boldenow. The B-1 may be limited to subsonic flight these days, but a heavy Lancer down at 500ft is always impressive. It represents some of the most challenging and exhilarating flying for the type's crews.

B-1 pilot Ryan adds: 'There is still a low-level mission for us. We may not put quite as much focus on it as we do on global power, for example, but we can fly down to 500 or 1,000ft depending on the pilot's individual qualifications. We have terrain-following radar [TFR], and so we can fly hands-off and hook up the radar to keep us at 500ft. Doing that for the first time at night really gets the hair on the back of your neck sticking up. In the training squadron we are required to do that at night for the first time without using NVGs [night vision goggles]. You are

**This image:** Low-level flying remains a tactic for the B-1 community.  
**Jim Haseltine**

**Inset:** A 337th TES B-1B drops a pair of GBU-31 JDAMs.  
**Jim Haseltine**





flying 10 degrees nose-down, pointing at the ground, and you're counting on the jet to keep you safe.' B-1 crews routinely fly low-level at night on the TFR, but they are not permitted to fly manually on the goggles.

## FUTURE FOCUS


Despite the plan to bring in the Long-Range Strike-Bomber as the ultimate B-1 replacement, more enhancements are in the pipeline. Boeing is on contract to upgrade the type's AN/APQ-164 radar under the Reliability and Maintainability Improvement Program (RMIP) to improve reliability and address obsolescence issues. Fielding of the upgrades began in March 2012. However, Northrop Grumman revealed in 2015 that its Scalable Agile Beam Radar-Global Strike (SABR-GS) is now being developed as an affordable, low-risk radar retro-fit for the B-1B. This would provide the bomber with advanced operational capabilities including large synthetic aperture radar (SAR) maps, advanced image processing and sensor integration, and greater system reliability than the APQ-164.

Ryan commented: 'The radar upgrade will help us particularly when the pod

is unusable, for example if there's poor weather. Our current radar is only really useful for tasks such as finding buildings. The RMIP effort will help us with greater fidelity.'

Of course, despite the mission system advances, these are complex and, now, ageing aircraft. The Lancers are extremely labor-intensive, and keeping sufficient jets on the line comes thanks to the hard work of the aircraft maintainers. Col Boldenow reflected on this. 'It's a complex and difficult machine to work

on, with a lot of moving pieces, but the maintainers work tremendously hard and do a great job of keeping aircraft available.'

The B-1 has earned itself a fearsome reputation as a potent CAS platform in recent years. It will continue to embrace hard-fought upgrades to help keep it relevant for current and future mission sets, and, despite past efforts to kill the Lancer off due to budget pressures, it looks set to continue its service for at least another quarter of a century. 

**This image:**  
The flightline at  
Ellsworth AFB.  
**Jim Haseltine**

**Inset:** The  
AGM-158 JASSM  
is now an  
important part of  
the B-1's arsenal.  
**Jim Haseltine**







# MILDENHALL SPECIAL OPS

The 352nd Special Operations Wing is US Air Force Special Operations Command's European airborne hub. It supports all kinds of clandestine missions and short-notice calls to action, operating in the shadows, always in a professional manner.

**report and photos:** Jamie Hunter

**S**TORIES OF DARING deeds and heroism are never far away when talking about Air Force Special Operations Command (AFSOC). The men and women of this very special organization are no strangers to putting themselves in harm's way, often in some of the most hostile regions of the world.

'If they know we are coming, we are too late.' So say the aircrews of the 352nd Special Operations Wing (SOW) at RAF Mildenhall, England. This is the newest wing within AFSOC, having been established in March this year as the 352nd Special Operations Group was

re-designated amid sweeping changes. Consisting of six squadrons and two groups, the 352nd SOW includes more than 1,200 Air Commandos on call to support special operations within Europe and further afield. 'We not only support Special Operations Command Europe [SOCEUR]', commented AFSOC chief Lt Gen Brad Heithold during the stand-up ceremony at Mildenhall, 'but we will also support Special Operations Command Africa, to combat the challenges we see and the struggles we have against violent extremism. And that is not going away anytime soon.'

The big changes here reflect a major 'recapitalization' effort, the Lockheed Martin MC-130J Commando II supplanting the MC-130H Combat Talon II, and the Bell Boeing CV-22B Osprey having replaced the MH-53M Pave Low IV. This new team of cutting-edge platforms forms the bedrock of a whole new era of AFSOC operations, and there are more changes coming. RAF Mildenhall is set to close, and as the two flying squadrons reach full operating capability (FOC) they will up-root and move to Spangdahlem AB in Germany, signaling the end of an era for AFSOC in the UK.

A 7th SOS CV-22 sweeps across the countryside near RAF Mildenhall in mid-summer evening light.





## IMPRESSIVE OSPREYS

The V-22 Osprey has had its fair share of critics. However, both the US Marine Corps and AFSOC speak highly of the capabilities of the tilt-rotor. Its ability to perform helicopter or C-130 Hercules-type missions make it ideally suited to the special ops community. Swooping in and out of hot landing zones (LZs), sometimes having transited for many miles at high level in 'aircraft mode', this is an ideal tool for inserting teams of highly-skilled ground troops. Its performance has opened up a range of 'infil' and 'exfil' options that the Pave Low simply could



not achieve. It is packed with technology including terrain-following radar, satellite communications and advanced countermeasures.

The Osprey is no longer a delicate development aircraft that needs to be treated with kid gloves. These are workhorses that regularly go into combat theaters. On December 21, 2013, AFSOC flew a rescue mission in southern Sudan, which nearly resulted in the loss of three Ospreys. A trio of AFSOC CV-22s from the 8th Special Operations Squadron (call sign 'Rooster flight') flew from Camp Lemonnier, Djibouti, heading for the city



of Bor, where widespread violence had trapped US civilians. The Ospreys were about to land in what they had been told was a 'permissive environment' at the United Nations compound in Bor, where the 30 US citizens had taken refuge, when 'a barrage of gunfire from the ground hit the formation 119 times.'

TSgt David Shea was manning the 0.5in-caliber machine gun on the rear ramp of 'Rooster 73' as they made their approach to the LZ. Suddenly they started taking fire. According to the report released by the 1st SOW, the three Ospreys suffered severe damage, and four Navy SEALs on the lead aircraft were in a critical condition having been hit by rounds that punctured the fuselage.

The severely-damaged CV-22s set immediate course for Entebbe airport in Uganda, 500 miles away, taking on fuel from an MC-130 en route. This mission to South Sudan is a testament to the survivability and versatility of the V-22,' said Maj Taylor Fingarson, who was flying 'Rooster 75'. 'There is not another aircraft in the world that could have done what we did that day.'

The crews at Mildenhall's 7th SOS have similar faith in their new mounts. Lt Col Roy Oberhaus is the squadron commander. He is a career special ops pilot with an impressive record flying the Pave Low, for which he proudly wears his

## AIR COMMANDOS

The 321st Special Tactics Squadron is a unit of combat controllers, pararescuemen (PJs) and special operations weathermen that essentially connect the aircraft with the ground elements. They can secure assault zone sites and furnish air traffic control and long-range secure command and control communications. Additionally, the unit provides combat trauma medical care, personnel recovery and terminal attack control of munitions delivered by fixed and rotary-wing aircraft. The squadron has special operations weathermen assigned to provide weather support for other military forces.

Capt Jeffrey Falcone is the director of operations for the unit. 'We have about 25 jobs but our main groups are the combat controllers, the PJs and our special operations weather. The combat controllers have several responsibilities: they go to ATC [air traffic control] school so they can control LZs; they are also Joint Terminal Attack Controllers [JTACs]. The PJs' focus is on the medical side — they are known for battlefield trauma in the special ops field.'

Squadron personnel have to maintain currency in a host of areas. 'We have dirt bikes, quads, side-by-sides [and] mini dune buggies, right up to large armored vehicles. We have boats, waverunners and inflatables plus scuba, as well as the aircraft — we parachute, as well as static line and freefall.'

Weapons School graduate patch. 'This squadron previously flew the MC-130H and we completed transition to the CV-22 Osprey earlier this year,' Oberhaus told *Combat Aircraft*. The 7th SOS received its first Ospreys in June 2013 and is now at IOC level with seven machines on the ramp. 'We have nine to 10 flight crews on the squadron and — although the plan is a moving target — we should build to around 15-17 crews and 10 CV-22s to reach full operating capability [FOC] in 2017.'

According to its official description, the 7th SOS 'operates the CV-22B executing night, adverse weather, long-range troop transport and re-supply operations into potentially hazardous areas. The squadron also supports noncombatant evacuation, humanitarian relief and other operations.'

The Osprey started out primarily as a Marine Corps program, before AFSOC jumped on board and created its own missionized derivative. 'Right now the Marine Corps uses the Osprey primarily as a troop transport, ferrying from ship to shore and from shore to ship,' added Lt Col Oberhaus. 'We use it primarily for special operations. If you look back through the early phase of the Osprey program there were a lot of critics. There's always going to be issues, but the majority of the incidents and accidents were the result of human error — not anything wrong with the

**This image:** AFSOC CV-22 pilots now wear combat fatigues in place of standard flying suits.

**Right page top to bottom:** Lt Col Roy Oberhaus, commander of the 7th SOS.

AFSOC boss Lt Gen Brad Heithold. **USAF**





**“We can fly the Osprey high and fast like a C-130, and fly low-level or land like a helicopter. Low-level is extremely important for us”**

**LT COL ROY OBERHAUS**



aircraft. If you build a computer network, there's a lot to learn. The V-22 is a network of systems connecting hardware and software together. It's a complex beast, but its versatility is undoubted.

'The obvious improvement over the MH-53 is the speed and range. We can fly high and fast like a C-130, and fly low-level or land like a helicopter. Low-level is extremely important for us. We typically set the terrain-following radar [TFR] and fly manually. We can set an altitude or a clearance from 100 to 1,000ft and we then get indications whether to climb or to descend.' At the moment, CV-22 pilots rely on the radar being presented on a head-down display. However, a number of modifications appear to be in the works, with a helmet-mounted display and a head-up display (HUD) both under examination.

MSgt Kevin Robertson, a maintenance production supervisor, talked about the versatility of the Osprey's cabin. 'We can configure for 24 troops, we can fast-rope or hoist, and if we fold up the seats we can carry small tactical vehicles or motorcycles. For water operations we can fly with small boats or jet-skis. We also have litter kits for humanitarian or medevac [medical evacuation] duties. It's all mission-dependant.'

The Mildenhall Ospreys are essentially forward-deployed assets. Once labeled as

a maintenance-heavy platform, dramatic progress does seem to have been made. Robertson commented: 'Things have improved... those engines that only lasted a few hours [back when the Marines were operating in dusty environments] are now lasting for hundreds of hours. The 352nd Special Operations Maintenance Squadron [SOMXS] provides all organizational and intermediate-level maintenance for the resident CV-22Bs.'

Maj Redahlia Person is the unit commander on the maintenance side: 'We have a phase dock here, and so every 210 [flight] hours we break an airplane down. We also have a handful of Bell Boeing field service representatives here, but they concentrate on the more in-depth troubleshooting.' Depot-level Osprey maintenance is planned to begin at unit level in 2018.

## NEW MISSIONS

Long-range personnel recovery (PR) missions have now come into the SOS remit, thanks to the Osprey. 'We are not a PR squadron — it's a sub-mission for us,' says Lt Col Oberhaus. 'The rescue squadrons are assigned to Air Combat Command but if a [fighter] went down on the continent, for example, they'd probably send us — we can get there faster. We always have folks ready to go on a fairly short string.'





Of course, the Marine Corps has made a significant step towards introducing new missions for its Ospreys. Adding weapons will see Marine Ospreys being called upon in some instances to perform close air support (CAS) tasks. The Air Force may well follow suit but it is not on such an aggressive timeline. 'The current AFSOC commander is a gunship crew member and he is firepower-centric,' Oberhaus said. 'It's all under consideration [but] we are probably not going down the same path as the Marine Corps. They have determined that they'd like to use the Osprey as a CAS platform. For AFSOC, as we build our mission packages, our

primary CAS platform is an AC-130. We expect to have that overhead as we go into an assault. If we were to put rockets and extra guns on [the Osprey] we are taking away our capability for carrying people in the back. Right now our combat load is around 4,000lb with a full bag of gas. We typically cube out [fill the cabin] before we hit that max weight. If we start putting rocket pods on [it will limit] what we can put in the back. We may not always have an AC-130 on hand, but if we're going into a non-permissive environment we will have something.'

Further weapons may not be on the immediate shopping list for the AFSOC







**This image:** 321st STS 'PJs' fast-rope from a CV-22 at Sculthorpe airfield.

**Above:** The Osprey has earned itself a strong reputation with AFSOC. Its versatility has opened up a variety of new missions for the SOS community.

**Inset left:** The primary flight displays in the CV-22 are four active matrix liquid crystal displays (AMLCDs).

Ospreys, but many other options are on the table, as Oberhaus explains. 'Our anti-ice protection system still needs some work and they're constantly looking at ways to improve and extend engine life. The engines ingest quite a lot of dust and they are working on the EAPS [engine air particle separator], improving those at filtering out that dust. NAVAIR controls the basic aircraft-related items like those, but the weapons, TFR, and our defensive additions are different — they are handled by our test unit at Hurlburt Field.'

### 'NIGHT OWLS'

The 67th SOS 'Night Owls' has been through a massive evolution, too. Gone are the ageing MC-130H Combat Talon IIs, and in have come the MC-130J Commando IIs. The unit's mission statement says that it exists 'to provide precise, reliable, flexible and responsive specialized air mobility. Utilizing night vision goggles, the aircraft penetrate potentially hazardous areas to conduct single- or multi-ship infiltration, exfiltration, and re-supply of special operations forces via air-drop or air-land

operations, and conduct long-range refueling operations of special operations vertical-lift assets. The squadron also supports information operations, humanitarian relief, medical evacuations and non-combatant evacuations.'

The commander of the 352nd Special Operations Aircraft Maintenance Squadron (SOAMXS), which provides organizational and intermediate-level maintenance for the new Commando IIs, is Maj Seanna Less. Having previously worked in F-22 maintenance operations, Less now runs the show for the Commando II fleet at Mildenhall and is highly complimentary regarding its serviceability. 'This is a very reliable aircraft; we are [in the] green most of the time.'

This is clearly a major advantage when compared to the MC-130H. Sgt Matthew Duggan-Childs, a flying crew chief with the unit, added: 'There's a lot of things we just don't need to do any more. For example, we used to have a 15-day inspection criteria for the 'legacy' [MC-130Hs] that involved us looking at the engines, the landing gear, and now

we have the J-models we have more advanced computer systems [in terms of diagnostics]. We've gained an aircraft that has a lot of bells and whistles.'

### COMMANDER'S PERSPECTIVE

Lt Col Brad Downs, commander of the 67th SOS, started out on the C-130E before joining AFSOC and flying the MC-130H. 'The Combat Talon II had all-weather terrain following [and it] was very good for tactical operations and was set up for the night mission,' he says. 'The MC-130J took the Marine KC-130J and modified it. It's extremely capable; it has much better range and it has opened up a lot of areas for us. The power on the 'J' is significant; it's the biggest difference, [plus our] fuel burn rates are vastly improved.'

Both the MC-130J and Air Combat Command's HC-130J Combat King II combat rescue tanker come off the Marietta production line essentially as common aircraft. However, as their respective users add new capabilities they are expected to diverge. For AFSOC, the MC-130J includes a tanker capability,





both as a receiver and as a provider, but some of the special operations nuances that the MC-130H offered, such as the TFR, are still several years away. Downs told this publication: 'Right now we predominantly fly visually at night on night vision goggles [NVGs], plus we have the HUD, which is a big difference — in the old aircraft it was all heads-down. We have the future potential to [overlay] the EO/IR [electro-optical/infra-red] image in the HUD, [but] we are working towards an all-weather capability [so] the biggest thing for us is the terrain-following radar — in the MC-130H we could fly down in the hundreds of feet — plus we're looking at increasing our defensive capabilities.'

The Marine Corps has made huge progress in weaponizing its KC-130Js. However, this isn't on the cards for the MC-130Js, since that mission will remain firmly with the AC-130 community.

Turning to the 67th's major missions, Downs said: 'We are supporting EUCOM, AFRICOM and CENTCOM. Essentially we are all over Europe working with our partners and NATO with a lot of joint combined training'. His unit is currently in IOC status, defined as being 'one deployable unit of aircraft'. Full capability for the squadron will be heralded by a 10-aircraft complement by the end of Fiscal Year 2016.



**Above:** The 'Night Owls' now fly the MC-130J Commando II. It provides a sturdy baseline for future enhancements in the special ops role.

**Left top to bottom:** Lt Col Brad Downs is the commander of the 67th SOS 'Night Owls'.

On the flightline at RAF Mildenhall, the special operations community is right behind the spread of the Super Hercules throughout its ranks.





‘Our basic crew consists of two pilots, two loadmasters and a combat systems officer [CSO — pronounced ‘sizzo’]. The CSO handles a lot of mission management, the refueling pods and the jobs the flight engineer used to do. Here at Mildenhall the STS [Special Tactics Squadron] is our main customer, but AFSOC is all about joint operations, so we work closely with Navy and Army special forces, and occasionally with MARSOC [Marine Special Operations], our newest SOCOM component.’

Being based in the UK affords the Mildenhall flying squadrons excellent potential for low-level training, which is extremely important. However, other environments are harder to come by on British shores. For the CV-22s, training in brown-out conditions in dusty LZs is virtually impossible, and for the MC-130s austere landing strips are ‘a challenge for us,’ says Lt Col Downs. ‘We use the airfield at Sculthorpe, but LZs here are not comparable to Afghanistan, for example.


[However], the low-level airspace is phenomenal — we get everything we could hope for. We train for low level almost every night.’

MC-130J pilot Capt Justin Mastrangelo offered a few more details of a typical training mission. ‘For every sortie we spend three to four hours the day prior planning our route and co-ordinating with external organizations. The day of the mission we show up five hours prior and look at the weather and NOTAMs [notices to airmen]. We brief as a formation before splitting off for our aircraft brief; then it’s a final quick route study before we step about an hour-and-a-half ahead of engine start.

‘The low-level skill set is a big deal for us. We fly a modified contour pattern, which means we can fly lower to the ground at night. The CSO is working the radar and we can use that radar picture to fly down at 300ft. With time and experience you can learn how to interpret what that radar is telling

you — it paints a good picture of the terrain ahead of us. The CSO is able to call out terrain for us, and we’re able to see it under our NVGs and fly that modified contour.’

The move to Spangdahlem is set to throw up more challenges for the two squadrons, especially when it comes to low-level flying. In Germany the height is limited to a minimum of 1,000ft. Lt Col Downs comments: ‘We know that Germany has different limitations, but we are working through opportunities to ensure that all of our training objectives will be met.’

The wing will likely look at training in neighboring countries, but the move is definitely on when Mildenhall closes at the end of this decade. In the meantime, the 352nd SOW will continue to ply its trade in the UK, and deploy its assets into some of the world’s most demanding combat trouble-spots. But the chances are that nobody will hear about it, and nobody will talk about it... 

“The power on the ‘J’ is significant; it’s the biggest difference [plus our] fuel burn rates are vastly improved”

**LT COL  
BRAD DOWNS**

**Right:** A CV-22 moves in for fuel from an MC-130J at last light.

**Below:** In the cockpit of a ‘Night Owls’ MC-130J.







UNTIL IT WAS formally established as a separate military branch on September 18, 1947, the US Air Force was part of the US Army. Its history can be traced to the creation of the Aeronautical Division, US Army Signal Corps in 1907, but the Department of the Air Force was formally founded by the National Security Act of 1947, and the Army Air Forces subsequently became the US Air Force.

The service has been on a combat footing for nearly 25 years and more than 25,000 airmen currently support operations around the world. Nearly 71,000 airmen are forward-stationed overseas and 205,000 directly support combatant commander requirements from their home stations. During 2014, Air Force aircraft flew nearly 20,000 close air support (CAS) sorties in Afghanistan, Iraq and Syria, 35,000 intelligence, surveillance, and reconnaissance (ISR) missions in the CENTCOM area of operations, 109,000 mobility/tanker sorties, and employed almost 4,000 munitions in support of Operation 'Inherent Resolve' alone. Since September 11, 2001, Air Force fighters, early warning aircraft and tankers have flown more than 67,000 sorties as part of the Operation 'Noble Eagle' homeland defense mission.



# AIR POWER REVIEW

An in-depth look at the units, bases and aircraft that constitute US Air Force air power in 2016.

**report:** Tom Kaminski



**Left:** F-15E and F-15SG Strike Eagles of the 366th Fighter Wing at Mountain Home AFB, Idaho.  
**Jamie Hunter**

**Right:** A C-130H of the 120th Airlift Wing, Montana ANG.  
**Jim Haseltine**

**Below:** An F-35A from the 461st Flight Test Squadron unleashes an AIM-120 AMRAAM.  
**Lockheed Martin**

Released in February 2015, the Department of Defense's \$585.3-billion budget request for Fiscal 2016 provided funding for 1,219,557 flying hours and support for a total aircraft inventory (TAI) of 4,919 aircraft, comprising 3,523 in the active component as well as 1,064 in the Air National Guard (ANG) and 332 in Air Force Reserve Command (AFRC). Additionally, it provides funding for the procurement of 112 new manned and unmanned aircraft including 44 F-35As, 12 KC-46As, five HC-130Js, eight MC-130Js, 14 C-130Js and 29 MQ-9As and six aircraft for the Civil Air Patrol at a cost of \$15.6 billion.

The USAF's budget called for retiring 334 fighter-class aircraft including the entire A-10C fleet by 2019. Based on the 2010 Quadrennial Defense Review, the Air Force conducted extensive analysis and determined that a force structure of 2,000 TAI and 1,200 primary mission aircraft inventory (PMAI) would be required to execute the National Defense Strategy with increased operational risk. Further analysis carried out in conjunction with the 2012 Defense Strategic Guidance and in the light of fiscal constraints showed that the Air Force could cut that force structure by approximately 100 additional aircraft at an even higher level of risk. The retirement of 334 fighter-class aircraft would bring the USAF below both of the latter limits.

The final National Defense Authorization Act (NDAA) for Fiscal 2016 included numerous provisions that limit the service's ability to follow through with that plan. In



accordance with the final authorization, the Secretary of the Air Force will be required 'to maintain a minimum of 171 A-10 aircraft in primary mission aircraft inventory (combat-coded) status' and 'may not move more than 18 A-10 aircraft in the active component to back-up flying status'. It directs the Secretary to 'commission an independent entity outside the Department of Defense to conduct an assessment of the required capabilities and mission platform to replace the A-10 aircraft.'

The NDAA further requires that, between October 1, 2015 and September 30, 2017, the Air Force will be required to maintain a TAI of 1,900 fighters including 1,100 that must be combat-coded, PMAI. Those aircraft include the A-10, F-15, F-16, F-22, and F-35 series.

The USAF had planned to retire six EC-130Hs and transfer another to test and development duties as an NEC-130H in Fiscal 2016. The NDAA

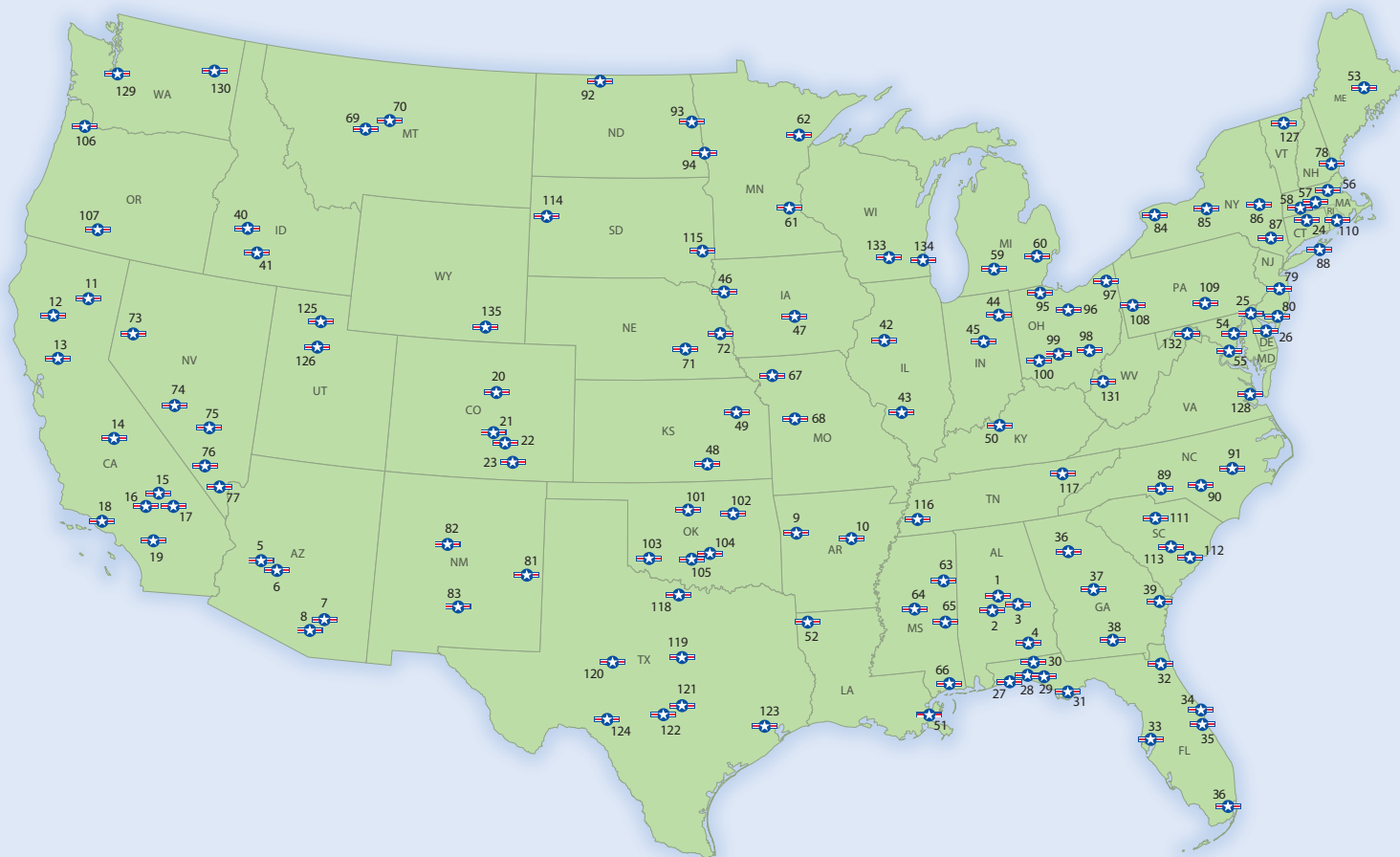
prohibits the service from retiring, preparing to retire, or placing in storage or on back-up flying status any EC-130H. It must conduct 'an assessment of the required capabilities or mission platform to replace the EC-130H aircraft, and to submit a report on that assessment to the congressional defense committees no later than December 31, 2016.'

## ORGANIZATION

Headquartered at the Pentagon in Arlington, Virginia, the Department of the Air Force is led by a four-star general, known as the Chief of Staff of the Air Force. He is responsible for the organization, training and equipping of 664,000 active-duty, Air National Guard, Air Force Reserve Command and civilian personnel serving in the continental United States (CONUS) and overseas. Nine of the service's 10 major commands (MAJCOM) operate the Air Force's vast fleet of around 5,500 aircraft, each led by a four-star general or a







three-star lieutenant general. Each of the commands is responsible for aircraft and personnel are tasked in support of one of the service's five interdependent and integrated core missions:

- Air and space superiority
- Intelligence, surveillance and reconnaissance
- Rapid global mobility
- Global strike
- Command and control

#### **Air Combat Command (ACC) —**

Headquartered at Joint Base Langley-Eustis, Virginia, ACC is responsible for five Numbered Air Forces (NAF) including one staffed by the Air National Guard and another that is assigned to Air Force Reserve Command. More than 83,000 active-duty and civilian personnel and more than 51,000 members of the ANG and AFRC are assigned to the command, which is responsible for over 1,300 aircraft.

#### **Air Education and Training Command**

**(AETC) —** More than 29,000 active-duty, 6,000 ANG and AFRC personnel, and 15,000 civilians and 11,000 contractor personnel are assigned to the command, which is headquartered at Joint Base

San Antonio-Randolph, Texas. AETC is responsible for two NAFs and approximately 1,300 aircraft.

#### **Air Force Global Strike Command**

**(AFGSC) —** Headquartered at Barksdale AFB, Louisiana, AFGSC is responsible for the nation's intercontinental ballistic missile wings and the operational fleet of 19 B-2A and 75 B-52H strategic bombers. Its assets are assigned to two NAFs. On October 1, 2015, AFGSC also assumed responsibility for more than 60 B-1Bs and 7,000 personnel previously assigned to ACC.

#### **Air Force Materiel Command (AFMC)**

— Wright-Patterson AFB, Ohio, is home to AFMC, which conducts research, development, test and evaluation, and provides acquisition management services and logistics support for the Air Force's weapon systems. The command is responsible for the Air Force Test Center (AFTC) at Edwards AFB, California, the Air Force Life Cycle Management Center (AFLCMC) at Wright-Patterson, the Air Force Sustainment Center (AFSC) at Tinker AFB, Oklahoma and the Air Force Nuclear Weapons Center (AFNWC) at Kirtland AFB, New Mexico.





## CONTINENTAL US USAF BASE GUIDE

### Alabama (AL)

1. Birmingham-Shuttlesworth International Airport
2. Maxwell-Gunter AFB
3. Montgomery Regional Airport-Dannelly Field
4. Lowe AHP, Fort Rucker

### Arizona (AZ)

5. Luke AFB
6. Phoenix Sky Harbor International Airport
7. Davis-Monthan AFB
8. Tucson International Airport

### Arkansas (AR)

9. Fort Smith Regional Airport/Ebbing ANGB
10. Little Rock AFB

### California (CA)

11. Beale AFB
12. Travis AFB
13. Moffett Federal Airport ANG
14. Fresno-Yosemite International Airport/ANGB
15. Edwards AFB
16. Palmdale/USAF Plant 42
17. Grey Butte FTOF, Palmdale
18. Point Mugu-Channel Islands ANG
19. March ARB

### Colorado (CO)

20. Buckley AFB, Aurora
21. USAFA Airfield, Colorado Springs
22. Peterson AFB
23. Pueblo Memorial Airport

### Connecticut (CT)

24. Bradley IAP/ANGB, Windsor Locks

### Delaware (DE)

25. New Castle County Airport
26. Dover AFB

### Florida (FL)

27. NAS Pensacola
28. Hurlburt Field
29. Eglin AFB
30. Duke Field
31. Tyndall AFB
32. Jacksonville International Airport
33. MacDill AFB
34. Patrick AFB
35. Melbourne International Airport
36. Homestead ARB

### Georgia (GA)

36. Dobbins ARB
37. Robins AFB
38. Moody AFB
39. Savannah Hilton Head IAP

### Idaho (ID)

40. Boise Airport-Gowen Field
41. Mountain Home AFB

### Illinois (IL)

42. General Downing-Peoria IAP
43. Scott AFB

### Indiana (IN)

44. Fort Wayne International Airport
45. Grissom ARB

### Iowa (IA)

46. Des Moines International Airport
47. Sioux Gateway/Col Bud Day Field

### Kansas (KS)

48. McConnell AFB
49. Forbes Field Airport, Topeka

### Kentucky (KY)

50. Louisville IAP-Standiford Field
51. NAS JRB New Orleans

### Louisiana (LA)

52. Barksdale AFB

### Maine (ME)

53. Bangor International Airport

### Maryland (MD)

54. Martin State AP/Warfield ANGB, Baltimore
55. JB Andrews-NAF Washington
56. Hanscom AFB
57. Westover ARB
58. Westfield Barnes Airport/ANGB

### Michigan (MI)

59. W. K. Kellogg Airport/ANGB, Battle Creek
60. Selfridge ANGB, Mount Clemens

### Minnesota (MN)

61. Duluth International Airport/ANGB
62. Minneapolis St Paul IAP/ARS

### Mississippi (MS)

63. Columbus AFB
64. Jackson IAP-Allen C. Thompson Field

### Missouri (MO)

65. Meridian Regional Airport-Key Field
66. Keesler AFB

### Montana (MT)

67. Rosecrans Municipal Airport, St Joseph
68. Whiteman AFB

### Nebraska (NE)

69. Malmstrom AFB
70. Great Falls International Airport

### Nevada (NV)

71. Lincoln Municipal Airport/ANGB
72. Offutt AFB

### New Hampshire (NH)

73. Reno Tahoe IAP/May ANGB
74. Tonopah Test Range

### New Jersey (NJ)

75. Groom Lake
76. Creech AFB

### New Mexico (NM)

77. Nellis AFB
78. Pease ANGB, Portsmouth IAP

### New York (NY)

79. JB McGuire-Dix-Lakehurst
80. Atlantic City International Airport/ANGB

### New Mexico (NM)

81. Cannon AFB
82. Kirtland AFB
83. Holloman AFB
84. Niagara Falls International Airport/JARS
85. Syracuse Hancock International Airport
86. Schenectady/Stratton ANG, Scotia

### New York (NY)

87. Stewart International Airport/ANGB
88. Francis S. Gabreski Airport/ANGB, Westhampton Beach

### North Carolina (NC)

89. Charlotte Douglas International Airport
90. Pope AAF, Fort Bragg

### North Dakota (ND)

91. Seymour Johnson AFB
92. Minot AFB

### Ohio (OH)

93. Grand Forks AFB
94. Hector International Airport, Fargo

### Oklahoma (OK)

95. Toledo Express Airport, Swanton
96. Mansfield Lahm Airport

### Oregon (OR)

97. Youngstown Warren Airport/JARS
98. Rickenbacker IAP/ANGB

### Pennsylvania (PA)

99. Springfield-Beckley Municipal Airport
100. Wright-Patterson AFB

### Rhode Island (RI)

101. Vance AFB
102. Tulsa International Airport

### South Carolina (SC)

103. Altus AFB
104. Tinker AFB

### South Dakota (SD)

105. Will Rogers Airport, Oklahoma City
106. Portland International Airport/ANGB

### Tennessee (TN)

107. Klamath Falls Airport-Kingsley Field
108. Pittsburgh International Airport/JARS

### Texas (TX)

109. Harrisburg International Airport
110. Quonset State/Holland ANGB

### Utah (UT)

111. Shaw AFB
112. JB Charleston

### Vermont (VT)

113. McEntire JNGS
114. Ellsworth AFB

### Virginia (VA)

115. Sioux Falls Airport-Joe Foss Field
116. Memphis International Airport

### Washington (WA)

117. McGhee Tyson/ANGB, Knoxville
118. Sheppard AFB

### West Virginia (WV)

119. NAS JRB Fort Worth/Carswell Field
120. Dyess AFB

### Wisconsin (WI)

121. JB San Antonio-Randolph
122. JB San Antonio-Kelly, Lackland AFB

### Wyoming (WY)

123. Ellington Field JRB
124. Laughlin AFB

### Yukon (YK)

125. Hill AFB
126. Wright ANGB/Salt Lake City IAP

### Zimbabwe (ZW)

127. Burlington International Airport
128. JB Langley-Eustis

### Other

129. JB Lewis-McChord
130. Fairchild AFB

### Other

131. Yeager Airport, Charleston
132. Shepherd ANG, Martinsburg

### Other

133. Dane County-Truax Field, Madison
134. Gen Mitchell IAP/ARS, Milwaukee

### Other

135. Cheyenne Municipal Airport

### Other

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### Other

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### Other

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### Other

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### Other

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### Other

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**Air Force Reserve Command (AFRC)** — Responsible for more than 330 aircraft and 69,000 personnel, AFRC is headquartered at Robins AFB, Georgia. Three NAFs are aligned with specific mission sets comprising strategic reach, power and vigilance and tactical reach/combat support. AFRC is responsible for 35 wings, 10 independent groups and support units that are integrated into each of the other nine MAJCOMs.

**Air Force Special Operations Command (AFSOC)** — Headquartered at Hurlburt Field, Florida, AFSOC is the Air Force component of US Special Operations Command. More than 19,500 personnel are assigned to the command, which is responsible for four active-duty special operations wings and one active-duty special operations group as well as the Air Force Special Operations Air Warfare Center (AFSOAWC). Gained organizations include two special operations wings assigned to the ANG and AFRC.

**Air Mobility Command (AMC)** — More than 1,000 airlift aircraft are operated by active-duty, ANG and AFRC wings, groups and squadrons assigned to AMC. Headquartered at Scott AFB,

Illinois, the command is responsible for a single NAF and more than 133,000 personnel. It is the air component of US Transportation Command.

**Pacific Air Forces (PACAF)** — Headquartered at Joint Base Pearl Harbor-Hickam, Hawaii, PACAF serves as the air component of US Pacific Command. Nearly 46,000 personnel and three NAFs are assigned to the command and its aircraft are based in Hawaii, Alaska, Guam, Japan and the Republic of Korea. The command is responsible for gained ANG and AFRC units in Alaska and Hawaii.

**US Air Forces Europe — Air Forces Africa (USAFE — AFAFRICA)** — Tasked as the air component for both US European Command and US Africa Command,

USAFE is headquartered at Ramstein Air Base, Germany. A single NAF, more than 35,000 personnel and over 200 aircraft are assigned.

**Air National Guard (ANG)** — Tasked with both State and Federal missions, the ANG is administered by the National Guard Bureau, a joint bureau of the departments of the Army and Air Force, and is headquartered at the Pentagon in Arlington, Virginia. More than 85 flying units are responsible for nearly 1,100 fixed-wing, rotary-wing and remotely-piloted aircraft, and more than 106,000 personnel are assigned. The ANG is responsible for units assigned to all 50 states, the District of Columbia and the US territories of Puerto Rico, the Virgin Islands and Guam.



**Left page:** The future remains uncertain for the A-10C, but it will remain in service for the immediate future.

**Jamie Hunter**

**Below:** The present and the future of USAF aerial refueling. The new Boeing KC-46 works with a KC-10A and KC-135R during recent development trials. **USAF/ Christopher Okula**



# AIRCRAFT AND SQUADRONS

## OF THE US AIR FORCE

### A-10C THUNDERBOLT II

Fairchild Republic delivered the last of 713 A-10As to the USAF in 1984. Despite several attempts by the service to retire the type, more than 280 examples remain in service.

The aircraft first saw combat during Operation 'Desert Storm' in January 1991. It has seen service over Bosnia, Afghanistan and more recently Syria.

In 2007, the first of around 100 ANG and AFRC A-10As received modifications that replaced the original television monitor with a single liquid-crystal, multi-function color display (MFCD)

and the Situational Awareness Datalink (SAL), which allowed the aircraft to share data with other platforms. The AN/AAQ-28 Litening AT advanced targeting pod, first fielded by the aircraft in 2003, was integrated with the aircraft systems. Flight-testing of the first A-10A+ began in November 2007 and the new variant deployed to Afghanistan in mid-2008.

Development of the aircraft's most significant upgrade began in February 2001 when Lockheed Martin was awarded a \$74-million engineering and manufacturing development (EMD) contract to integrate the precision engagement (PE) program. It

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
AATC	Davis-Monthan AFB, Arizona	A-10C	57th Wing/ USAFWS	ACC	DP
Det 303, 495th FG (see Note 1)	Whiteman AFB, Missouri	A-10C	20th FW/ 495th FG	ACC	KC
25th FS	Osan AB, Republic of Korea	A-10C	51st FW/OG	PACAF	OS
40th FLT5	Eglin AFB, Florida	A-10C	96th TW/OG	AFMC	ET
66th WPS	Nellis AFB, Nevada	A-10C	57th Wing/ USAFWS	ACC	WA
75th FS	Moody AFB, Georgia	A-10C	23rd Wing/ 23rd FG	ACC	FT
74th FS	Moody AFB, Georgia	A-10C	23rd Wing/ 23rd FG	ACC	FT
354th FS	Davis-Monthan AFB, Arizona	A-10C	355th FW/OG	ACC	DM
357th FS (FTU)	Davis-Monthan AFB, Arizona	A-10C	355th FW/OG	ACC	DM
422nd TES	Nellis AFB, Nevada	A-10C	53rd Wing/ 53rd TEG	ACC	OT
Air National Guard units					
104th FS	Martin State Airport/ Warfield ANGB, Baltimore, Maryland	A-10C	175th Wing/ OG	ACC	MD
107th FS	Selfridge ANGB, Mount Clemens, Michigan	A-10C	127th Wing/ OG	ACC	MI
163rd FS	Fort Wayne International Airport, Indiana	A-10C	122nd FW/OG	ACC	IN
190th FS	Boise Airport-Gowen Field, Idaho	A-10C	124th FW/OG	ACC	ID
Air Force Reserve Command units					
47th FS (FTU)	Davis-Monthan AFB, Arizona	A-10C	944th FW/ 924th FG	ACC	DP
76th FS (see Note 2)	Moody AFB, Georgia	A-10C	442nd FW/ 476th FG	ACC	FT
303rd FS	Whiteman AFB, Missouri	A-10C	442nd FW/OG	ACC	KC
706th FS (see Note 2)	Nellis AFB, Nevada	A-10C	926th Wing/ OG		WA

1 Active associate squadron utilizes aircraft with the host 442nd Fighter Wing.  
2 Classic associate squadron utilizes aircraft assigned to host wing.

#### ABBREVIATIONS

AACS	Airborne Air Control Squadron
AAF	Army Air Field
AATC	ANG/AFRC Test Center
AATTC	Advanced Airlift Tactics Training Center
AB	Air Base
ACA	Aerospace Control Alert
ACC	Air Combat Command
ACCS	Airborne Command Control Squadron
ACTS	Air Combat Training Squadron
ACG	Air Control Group
ACW	Air Control Wing
ADS	Air Demonstration Squadron
AETC	Air Education and Training Command
AFDW	Air Force District of Washington
AFGSC	Air Force Global Strike Command
AFSAC	Air Force Security Assistance and Co-operation Directorate
AFSOAWC	Air Force Special Operations Air Warfare Center
AFSOC	Air Force Special Operations Command

### B-1B LANCER

Based on the earlier B-1A, which was developed in response to a requirement for an Advanced Manned Strategic Aircraft (AMSA) and cancelled in June 1977, development of the B-1B began in October 1981 and the initial aircraft flew in October 1984. Rockwell International, which later became part of the Boeing

Company, delivered the first Lancer to Dyess AFB, Texas in June 1985 and the new bomber reached initial operational capability in October 1986. The last of 100 B-1Bs was delivered in May 1988.

Although the bomber was intended as a long-range strategic bomber to penetrate Soviet defenses and deliver nuclear

weapons, that capability was removed in 1992.

The versatile, multi-mission weapon system carries the largest payload of both guided and unguided conventional weapons in the Air Force inventory. B-1B crews have been engaged in continuous combat operations since 2001 and have flown more than 14,000 combat missions.



B-1Bs assigned to the 337th TES at Dyess AFB.  
**Jim Haseltine**



integrated a Mil Std 1760 databus, and AN/AAQ-28 and AN/AAQ-33 Sniper targeting pods. The digital stores management system (DSMS) provided a central interface control unit (CICU) and a pair of MFCDS and a new armament/head-up display control panel. A new control stick grip and right throttle are common with the F-16 and F-15E, and advanced targeting pod and Mil Std 1760 capabilities were incorporated on six stores pylons, providing the aircraft with a new precision weapons capability. In 2009 the A-10C received clearance to employ the GBU-54 Laser Joint Direct Attack Munition (LJDAM).

The first A-10C was unveiled at Eglin AFB, Florida, in January 2005 and it achieved initial operational capability (IOC) with the Maryland Air National Guard's 104th Fighter Squadron in August 2007. The unit first employed a Joint Direct Attack Munition (JDAM) during its initial deployment to Al Asad Air Base, Iraq, in September 2007.

Delivery of the final A-10C occurred at Hill AFB, Utah, in July 2011, when the Ogden Air Logistics Center (OO-ALC), now Complex,

completed the 349th production upgrade.

Integration of a helmet-mounted integrated targeting (HMIT) system began in July 2010. The Gentex Scorpion helmet-mounted cueing system (HMCS), which provides day/night color displays, was first fielded by the 74th Fighter Squadron in 2013.

Available from 2015, the operational flight program (OFP) software Suite 8 provided the latest Mode 5 identification friend or foe (IFF) capability and Lightweight Airborne Recovery System (LARS) improvements. A Suite 9 update to the OFP was cancelled due to planned retirement of the A-10C.

On June 29, 2007, Boeing received a contract to construct up to 242 sets of enhanced wing assemblies (EWA) for the A-10 fleet. Based on the wing fitted to late-production A-10s and rated for 16,000 flight hours, installation extends the service life of the aircraft until the 2030 timeframe.



An A-10C assigned to the USAF Weapons School's 66th WPS. **Jamie Hunter**

The project was initially reduced to 233 sets as a result of budget cuts and planned retirements, and Boeing has only received orders for 173. The first EWA was delivered to the OO-ALC in March 2011. Following installation, the upgraded aircraft flew for the first time in November and was formally rolled out at Hill AFB in February 2012. Completion of the effort is scheduled for Fiscal 2017.

Although the proposed Fiscal 2015 budget removed funding

for any proposed A-10 upgrades, it continues to fund those modifications that are required in order to keep the aircraft viable until the USAF's planned phase-out in 2019.

Between April 2013 and May 2014, 49 A-10Cs were placed in storage with the 309th AMARG alongside 122 un-modified A-10As. A-10Cs are operated by 18 active USAF, ANG and AFRC units that include eight combat-coded squadrons.

Since entering service the bomber has been the subject of multiple block upgrades including the Conventional Mission Upgrade Program (CMUP) that enabled it to deliver precision-guided weapons. It also received an improved synthetic aperture radar, upgrades to the defensive countermeasures system and the ability to carry targeting pods.

The most recent project is also the largest modification to be developed for the B-1B. The integrated battle station (IBS) and Sustainment Block 16 (SB 16) upgrade combines three separate updates that provide the aircraft with a fully-integrated datalink (FIDL), giving the Lancer line-of-sight and beyond line-of-sight command and control (C2) connectivity and providing two tactical data processors and five multi-function displays for the B-1B's aft crew stations.

Additionally, a vertical situation display upgrade (VSDU) replaces the pilot and co-pilot's primary flight displays and associated flight instruments with two color displays at pilot and co-pilot stations to provide primary and back-up flight information (PFI). A central integrated system (CITS) upgrade provides a new on-board diagnostic system.

SB 16A software enhances the 'glass' cockpit installed by the IBS modification and increases Link 16 capabilities. Link 16 allows all equipped platforms to exchange overall tactical pictures in near-real time. Major software enhancements include improved integration between the B-1's offensive avionics system, various on-board sensors and the datalink.

The first operational B-1B to be upgraded with the IBS modifications arrived at Dyess AFB in January 2014. Modification

of the entire fleet should be completed by 2019, allowing the bombers to remain viable until 2040. Further modifications will replace the Lancer's current AN/APQ-164 radar with a new active electronically-scanned array (AESA) system. Based on the Northrop Grumman

AN/APG-83, developed for the F-16, the Scalable Agile Beam Radar — Global Strike (SABR-GS) will be installed on the Lancer beginning in 2016.

The B-1B fleet currently includes 62 aircraft that are operated by eight active-duty squadrons and a single AFRC associate squadron.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
9th BS	Dyess AFB, Texas	B-1B	7th BW/OG	AFGSC	DY
28th BS (FTU)	Dyess AFB, Texas	B-1B	7th BW/OG	AFGSC	DY
31st TES (see Note 1)	Edwards AFB, California	B-1B	53rd Wing/53rd TEG	ACC	ED
34th BS	Ellsworth AFB, South Dakota	B-1B	28th BW/OG	AFGSC	EL
37th BS	Ellsworth AFB, South Dakota	B-1B	28th BW/OG	AFGSC	EL
77th WPS	Dyess AFB, Texas	B-1B	57th Wing/USAFWS	ACC	WA
337th TES (see Note 2)	Dyess AFB, Texas	B-1B	53rd Wing/53rd TEG	ACC	DY
419th FLT5	Edwards AFB, California	B-1B	412th TW/OG	AFMC	ED
Air Force Reserve Command units					
345th BS (see Note 3)	Dyess AFB, Texas	B-1B	307th BW/489th BG	AFRC	DY

1 Squadron utilizes aircraft assigned to 419th FLT5.  
2 Squadron utilizes aircraft assigned to 28th BW.  
3 Classic associate squadron utilizes aircraft assigned to host wing.



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
13th BS	Whiteman AFB, Missouri	B-2A	509th BW/OG	AFGSC	WM
31st TES (see Note 1)	Edwards AFB, California	B-2A	53rd Wing/ 53rd TEG	ACC	ED
72nd TES (see Note 1)	Whiteman AFB, Missouri	B-2A	53rd Wing/ 53rd TEG	ACC	WM
325th WPS (see Note 1)	Whiteman AFB, Missouri	B-2A	57th Wing/ USAFWS	ACC	WM
393rd BS	Whiteman AFB, Missouri	B-2A	509th BW/OG	AFGSC	WM
394th CTS (FTU) (see Note 2)	Whiteman AFB, Missouri	B-2A	509th BW/OG	AFGSC	WM
419th FLTS	Edwards AFB, California	B-2A	412th TW/OG	AFMC	ED
Air National Guard units					
110th BS (see Note 3)	Whiteman AFB, Missouri	B-2A	131st BW/OG	AFGSC	WM

1 Squadron utilizes aircraft assigned to host wing.  
2 394th CTS utilizes 325th/393rd BS B-2As for training.  
3 Classic associate squadron utilizes aircraft assigned to host 509th BW.



## B-2A SPIRIT

Development of the B-2A began in November 1981, when Northrop was awarded a \$7.3-billion contract associated with the Advanced Technology Bomber (ATB). Although the project originally called for 132 production aircraft, ultimately only 21 Spirits were delivered. The aircraft, which incorporated low-observable technologies, was publicly displayed for the first time in November 1988, when it was rolled out at Palmdale, California. The B-2A flew for the first time in July 1989 and the initial aircraft was delivered to the USAF in December 1993.

Early B-2s were delivered in Block 10 configuration with a limited combat capability that included 2,000lb (907kg) Mk84 conventional bombs or gravity nuclear weapons. Block 20-configured aircraft were provided with an interim capability to deliver the GPS-Aided Munition (GAM). Block 30 examples are fully capable and featured additional radar modes, enhanced terrain-following capability and the ability to deliver additional weapons, including the Joint Direct Attack Munition (JDAM) and the Joint Stand-Off Weapon (JSOW).

Those aircraft built to the earlier configurations were all brought up to Block 30 standard.

Since entering service the fleet has received many upgrades, and recent projects have equipped the B-2A with additional weapons, new communications capabilities and upgraded its radar via the Radar Modernization Program (RMP). Major updates are providing a new satellite communications system, computers and additional weapons capabilities as well as upgrades to the bomber's defensive management system. A host of smaller upgrades that will improve safety, reliability, maintainability, and/or improve system performance are under way as well.

The Spirit, which first saw combat over Kosovo in March 1999, is the USAF's only long-range strike aircraft capable of penetrating advanced integrated air defense systems and delivering weapons against heavily-defended targets. Tasked with nuclear and conventional missions, the fleet of 20 B-2As is flown by eight test, training and operational squadrons that include a single ANG associate squadron. Since entering service, the aircraft have flown more than 118,600 hours including over 3,000 in combat.

## B-52H STRATOFORTRESS

Flown for the first time as the B-52A in 1954, the Stratofortress is the longest-serving combat aircraft in US history. It entered service in 1955 as the B-52B, and when production ended in October 1962 a total of 744 B-52s had been built. Today only the B-52H remains in the inventory. The first of 102 B-52Hs was delivered in May 1961, but the aircraft has seen many upgrades since then. Today 76 aircraft remain in service with AFGSC, including 18 that are assigned to AFRC.

The B-52H is currently in use with nine USAF operational and test squadrons and a single AFRC unit, which is tasked as the formal training unit (FTU) for the bomber. An active associate USAF squadron carries out this role alongside the AFRC unit. The fleet's 44 combat-coded bombers are divided

between the 2nd Bomb Wing at Barksdale AFB, Louisiana and the 5th Bomb Wing at Minot AFB, North Dakota. Each operational squadron, comprising the 20th and 96th Bomb Squadrons at Barksdale and the 23rd and 69th Bomb Squadrons at Minot, is assigned 11 combat-coded aircraft and two airframes that are assigned as back-up aircraft inventory (BAI).

The Stratofortress is currently receiving an update that greatly enhances the aircraft's combat capabilities in the digital battlespace. The combat network communications technology (CONNECT) upgrade installs new multi-functional color displays (MFCDs), computer architecture, multiple datalinks and enhanced voice communications capabilities. Installed by the Oklahoma City Air Logistics Complex (OC-ALC) during

## C-5A/B/C/M GALAXY

Winner of the 1964 CX-HLS (Cargo Experimental — Heavy Logistic System) competition, the Galaxy is one of the largest aircraft in the world. First flown as the C-5A in June 1968, it is capable of carrying outsized cargo over intercontinental ranges. The Galaxy can carry as many as 36 standard 463-liter pallets, and a troop compartment located in the aircraft's upper deck can seat 73 passengers. Although 267 airline seats may be installed on the cargo compartment floor, this configuration is rarely used.

The first C-5A was delivered in December 1969 and the initial

operational Galaxy followed in June 1970. Although 81 Galaxies were delivered by 1973, a shortfall in airlift aircraft resulted in a re-start of the production line, and between January 1986 and March 1989 a total of 50 improved C-5Bs were delivered. These incorporated numerous improvements including strengthened wings and updated avionics.

Although the Galaxy has served as the backbone of the USAF's strategic airlift fleet, the age of its engines and avionics plagued reliability rates. However, testing and analysis showed that the

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
9th AS	Dover AFB, Delaware	C-5M	436th AW/OG	AMC	
22nd AS	Travis AFB, California	C-5C/M	60th AMW/ OG	AMC	
Air Force Reserve Command units					
312th AS (see Note 1)	Travis AFB, California	C-5C/M	60th AMW/ OG	AMC	
68th AS	JB San Antonio-Lackland (Kelly Field), Texas	C-5A	433rd AW/OG	AMC	
326th AS (see Note 1)	Dover AFB, Delaware	C-5M	512th AW/OG	AMC	
337th AS	Westover ARB, Massachusetts	C-5B	439th AW/OG	AMC	
356th AS (FTU)	JB San Antonio-Lackland (Kelly Field), Texas	C-5A	433rd AW/OG	AMC	

1 Classic associate squadron utilizes aircraft assigned to host wing.



programmed depot maintenance (PDM), the upgrade enables network-centric operations (NCO) and will allow crews to receive and send real-time digital information including intelligence, mapping

and targeting information and communicate with other platforms via satellite. The integrated suite supports mission re-tasking and weapons re-targeting for the AGM-86C/D Conventional Air-

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
11th BS (FTU) (see Note 1)	Barksdale AFB, Louisiana	B-52H	2nd BW/OG	AFGSC	LA
20th BS	Barksdale AFB, Louisiana	B-52H	2nd BW/OG	AFGSC	LA
23rd BS	Minot AFB, North Dakota	B-52H	5th BW/OG	AFGSC	MT
49th TES	Barksdale AFB, Louisiana	B-52H	53rd Wing/ 53rd TEG	ACC	OT
69th BS	Minot AFB, North Dakota	B-52H	5th BW/OG	AFGSC	MT
96th BS	Barksdale AFB, Louisiana	B-52H	2nd BW/OG	AFGSC	LA
31st TES (see Note 2)	Edwards AFB, California	B-52H	53rd Wing/ 53rd TEG	ACC	ED
340th WPS (see Note 2)	Barksdale AFB, Louisiana	B-52H	57th Wing/ USAFWS	ACC	LA
419th FLT	Edwards AFB, California	B-52H	412th TW/OG	AFMC	ED
Air Force Reserve Command units					
93rd BS (FTU)	Barksdale AFB, Louisiana	B-52H	307th BW/OG	AFGSC	BD

1 Active associate squadron utilizes aircraft assigned to AFRC's 93rd BS. Squadron utilizes aircraft assigned to host wing.



A B-52H of the 2nd BW at Barksdale AFB. **Jamie Hunter**

Launched Cruise Missile (CALCM) and AGM-158 Joint Air-to-Surface Stand-off Missile/JASSM — Extended Range (JASSM/JASSM-ER) weapons. The bomber has a weapons payload of more than 70,000lb (31,751kg) and is capable of carrying the most diverse range of nuclear and conventional weapons of any combat aircraft in the inventory. The advanced weapons integration (AWI) and internal weapons bay upgrade

(IWBU) programs will provide a 60 per cent increase in the aircraft's smart weapons payload.

In order to meet the requirements of the New START nuclear weapons treaty, the ability to deliver nuclear weapons is being removed from 30 operational bombers as well as 12 that are stored at Davis-Monthan AFB, Arizona. The B-52H is expected to remain in service until the 2040s.

aircraft had 80 per cent of its structural service life remaining. Begun in 1999, the Avionics Modernization Program (AMP) was intended to replace the avionics on the 126-aircraft fleet with a modern digital cockpit.

The initial AMP-equipped C-5B carried out its maiden flight at Dobbins ARB, Georgia on December 21, 2002 and the first upgraded C-5A followed in August 2003. By April 2012, 27 C-5As, 50 C-5Bs and two C-5Cs that were previously modified to transport USAF and NASA space program cargo received the AMP modifications. Plans are under way to replace the

C-5's core mission computer (CMC) and weather radar to mitigate obsolescence of the existing systems.

Development of the Reliability Enhancement and Re-engining Program (RERP) began in late 2001. The original plans called for upgrading more than 120 C-5s under the RERP including one C-5A and two C-5Bs that served as prototypes. RERP replaced the aircraft's TF39 turbofans with the General Electric F138-GE-100 (CF6-80C2) engines, which provided a 22 per cent increase in power. It brought about more than 50 improvements to the aircraft's

structure and systems, added a more powerful auxiliary power unit and installed the Northrop Grumman AN/AAQ-24 Large Aircraft Infra-Red Countermeasures (LAIRCM) system. Changes to the airlift fleet resulted in the decision to retire the C-5A and to scale back the RERP. When the project is completed in 2016, one C-5A, 49 C-5Bs and two C-5Cs will have been upgraded to C-5M configuration. C-5As are still operated by two AFRC squadrons and a single AFRC unit flies the C-5B. C-5Ms are operational with two active-duty USAF squadrons and shared with a pair of AFRC associate squadrons.



A C-5M of the 60th AMW at Travis AFB. **Lockheed Martin**

#### ABBREVIATIONS

AFB	Air Force Base
AFMC	Air Force Materiel Command
AFRC	Air Force Reserve Command
AFTC	Air Force Test Center
AG	Airlift Group
AGRS	Aggressor Squadron
AMARG	Aerospace Maintenance and Regeneration Group
AMC	Air Mobility Command
AMTS	Air Mobility Training Squadron
AMW	Air Mobility Wing
ANG	Air National Guard
ANGB	Air National Guard Base
ANGS	Air National Guard Station
ARB	Air Reserve Base
ARG	Air Refueling Group
ARS	Air Refueling Squadron
ARS	Air Reserve Station
ARW	Air Refueling Wing
AS	Airlift Squadron
ASF	Aviation Standards Flight
ATG	Adversary Tactics Group
ATKS	Attack Squadron
ATKW	Attack Wing
ATRS	Aerial Targets Squadron
AW	Airlift Wing
BS	Bomb Squadron
BW	Bomb Wing
CCW	Command & Control Wing
CTS	Combat Training Squadron



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
2nd ARS	JB McGuire-Dix-Lakehurst, New Jersey	KC-10A	305th AMW/OG	AMC	
6th ARS	Travis AFB, California	KC-10A	60th AMW/OG	AMC	
9th ARS	Travis AFB, California	KC-10A	60th AMW/OG	AMC	
32nd ARS	JB McGuire-Dix-Lakehurst, New Jersey	KC-10A	305th AMW/OG	AMC	
Air Force Reserve Command units					
70th ARS (see Note 1)	Travis AFB, California	KC-10A	349th AMW/OG	AMC	
76th ARS (see Note 1)	JB McGuire-Dix-Lakehurst, New Jersey	KC-10A	514th AMW/OG	AMC	
78th ARS (see Note 1)	JB McGuire-Dix-Lakehurst, New Jersey	KC-10A	514th AMW/OG	AMC	
79th ARS (see Note 1)	Travis AFB, California	KC-10A	349th AMW/OG	AMC	

1 Classic associate squadron utilizes aircraft assigned to host wing.

## KC-10A EXTENDER

Based on the DC-10-30CF airliner, the KC-10A was selected as the winner of the Advanced Tanker/Cargo Aircraft (ATCA) competition in December 1977. The Extender shared 88 per cent systems commonality with the DC-10, but was equipped with a number of additional systems that include military avionics, an aerial refueling boom, hose and drogue, aerial refueling operator station, aerial refueling receptacle and satellite communications.

The Extender entered service at March AFB, California, in October 1981. While its primary mission is aerial refueling, the KC-10A can combine the tasks of a tanker and cargo aircraft by refueling aircraft and simultaneously carrying

support personnel and equipment on overseas deployments. It is capable of transporting up to 75 personnel and nearly 170,000lb (76,560kg) of cargo around 4,400 miles (7,040km) unrefueled. The KC-10A can carry more than 356,000lb (160,200kg) of fuel, nearly doubling the capacity of the KC-135. Additionally, the advanced aerial refueling boom, and internal and wing-mounted hose-and-drogue refueling system allow the aircraft to refuel a wide variety of US and allied military aircraft during a single mission.

McDonnell Douglas, which later became part of Boeing, delivered 60 KC-10As to the USAF, and 59 remain in service with four USAF and four AFRC associate squadrons.



A KC-10A from the 305th AMW refuels an F-22 Raptor. USAF/SSgt Andy M. Kin

### ABBREVIATIONS

Det	Detachment	FTRS	Fighter Training Squadron
DIA	Defense Intelligence Agency	FTS	Flying Training Squadron
DSCA	Defense Security Co-operation Agency	(FTU)	Formal Training Unit
FG	Fighter Group	FTW	Flying Training Wing
FLTF	Flight Test Flight	HQ	Headquarters
FLTG	Flight Test Group	HG	Helicopter Group
FLTS	Flight Test Squadron	HS	Helicopter Squadron
FS	Fighter Squadron	IFS	Introductory Flight Screening
FW	Fighter Wing		
FTG	Flying Training Group	JARS	Joint Air Reserve Station
FTOF	Flight Test Operations Facility	JB	Joint Base

## BEECHCRAFT C-12C/D/F/J HURON, MC-12W LIBERTY

The King Air A200 was selected in 1975 to fulfill the USAF's CX-X requirement for an aircraft to support US embassies and military attaches worldwide. It was initially

acquired as the C-12A. After being equipped with a more powerful version of the Pratt & Whitney Canada PT6A turboprop, the majority were re-designated as

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
DIA Air Operations (see Note 1)	Wright-Patterson AFB, Ohio	C-12C/D	AFSAC/HQ DIA	AFMC	
DSCA (see Note 1)	Wright-Patterson AFB, Ohio	C-12C/D	AFSAC	AFMC	
Det 1, 517th AS	JB Elmendorf-Richardson, Alaska	C-12F	3rd Wing/OG	PACAF	
1st AS	JB Andrews-NAF Washington, Maryland	C-12C	89th AW/OG	AMC	
419th FLTS (see Note 2)	Edwards AFB, California	C-12C	412th TW/OG	AFMC	ED
459th AS	Yokota AB, Japan	C-12J	374th AW/OG	PACAF	
586th FLTS	Holloman AFB, New Mexico	C-12J	96th TW/TESTG	AFMC	HT
Air National Guard units					
185th ARS	Will Rogers ANGB/World Airport, Oklahoma City, Oklahoma	MC-12W	137th ARW/OG	AFSOC	

1 DIA/DSCA aircraft operated from numerous worldwide sites.

2 C-12Cs are maintained by NASA Dryden. 419th FLTS is also the FTU for the USAF C-12C/D.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
3rd AS	Dover AFB, Delaware	C-17A	436th AW/OG	AMC	
4th AS	JB Lewis-McChord, Washington	C-17A	62nd AW/OG	AMC	
6th AS	JB McGuire-Dix-Lakehurst, New Jersey	C-17A	305th AMW/OG	AMC	
7th AS	JB Lewis-McChord, Washington	C-17A	62nd AW/OG	AMC	
8th AS	JB Lewis-McChord, Washington	C-17A	62nd AW/OG	AMC	
10th AS (see Note 1)	JB Lewis-McChord, Washington	C-17A	62nd AW/OG	AMC	
14th AS	JB Charleston, South Carolina	C-17A	437th AW/OG	AMC	
15th AS	JB Charleston, South Carolina	C-17A	437th AW/OG	AMC	
16th AS	JB Charleston, South Carolina	C-17A	437th AW/OG	AMC	
21st AS	Travis AFB, California	C-17A	60th AMW/OG	AMC	
57th WPS (see Note 2)	JB McGuire-Dix-Lakehurst, New Jersey	C-17A	57th Wing/USAFWS	ACC	
58th AS (FTU)	Altus AFB, Oklahoma	C-17A	97th AMW/OG	AETC	
418th FLTS	Edwards AFB, California	C-17A	412th TW/OG	AFMC	
517th AS	JB Elmendorf-Richardson, Alaska	C-17A	3rd Wing/OG	PACAF	AK
535th AS	JB Pearl Harbor-Hickam, Hawaii	C-17A	15th Wing/OG	PACAF	HH
Air National Guard units					
204th AS (see Note 3)	JB Pearl Harbor-Hickam, Hawaii	C-17A	154th Wing/OG	PACAF	HH
249th AS (see Note 4)	JB Elmendorf-Richardson, Alaska	C-17A	176th Wing/OG	PACAF	AK
137th AS	Stewart International Airport/ANGB, Newburgh, New York	C-17A	105th AW/OG	AMC	



C-12Cs. Six C-12Ds, which are based on the King Air B200, followed later. Both models are operated by the USAF from foreign states in support of US embassy activities in host nations. The aircraft are primarily tasked in support of the Defense Security Co-operation Agency (DCSA). Air Force Materiel Command is responsible for the aircraft, and aircrew training is now carried out by the US Army at Fort Rucker, Alabama. The first of 46 King Air B200Cs were acquired in 1984 for use in the Operational Support Airlift (OSA) role and assigned the

designation C-12F. These were followed in 1986 by six Beech 1900C airliners that received the designation C-12J. During 1996 the majority of the C-12Fs and two of the C-12Js were transferred to the US Army.

In November 2008, the USAF purchased eight pre-owned King Air 350 that were converted into intelligence, surveillance and reconnaissance (ISR) aircraft as part of Project Liberty. Modifications were carried out by L-3 Communications Integrated Systems and the first MC-12W

arrived in Iraq in June 2009.

Operations in Afghanistan began in December 2009, but in 2011 the aircraft were withdrawn from Iraq. The USAF formally concluded MC-12W operations in Afghanistan in October 2014 when the US Army's Joint Task Force Thor assumed responsibility for the deployed aircraft. The fleet had flown more than 400,000 combat hours and 79,000 combat sorties in Iraq and Afghanistan.

Developed as a quick reaction capability (QRC) in response to urgent requirements in Afghanistan and Iraq, the MC-12W as equipped with a variety of sensors and systems, including an electro-optical/infra-red (EO/IR) turret that included a laser pointer. Capable of providing full-motion video (FMV), the aircraft featured a line-of-sight datalink for remote video terminals (RVT), a limited SIGINT collection

capability and narrow-band INMARSAT datalink for beyond line-of-sight connectivity.

Subsequent aircraft were produced using new-build airframes and a total of 42 MC-12Ws were delivered to Air Combat Command, although the majority were operated overseas. Additional aircraft were delivered to US Special Operations Command (SOCOM) and the US Army.

As part of the draw-down of operations in Afghanistan, in 2014 the USAF made the decision to divest the MC-12W fleet. As a result, the majority of the aircraft have been reassigned to the US Army and SOCOM. Additionally, 13 MC-12Ws are being transferred to the Oklahoma Air National Guard, which received its first Liberty aircraft in July 2015. ACC flew its final MC-12W mission at Beale AFB, California, on September 16, 2015.

MC-12Ws are now assigned to the Oklahoma ANG. **USAF**



155th AS	Memphis International Airport, Tennessee	C-17A	164th AW/OG	AMC	
167th AS	Eastern West Virginia Regional Airport/Shepherd ANG, Martinsburg, West Virginia	C-17A	167th AW/OG	AMC	
183rd AS	Jackson International Airport-Allen C. Thompson Field, Mississippi	C-17A	172nd AW/OG	AMC	
Air Force Reserve Command units					
89th AS	Wright-Patterson AFB, Ohio	C-17A	445th AW/OG	AMC	
97th AS	JB Lewis-McChord, Washington	C-17A	446th AW/OG	AMC	
300th AS (see Note 5)	JB Charleston, South Carolina	C-17A	315th AW/OG	AMC	
301st AS (see Note 5)	Travis AFB, California	C-17A	349th AMW/OG	AMC	
313th AS (see Note 5)	JB Lewis-McChord, Washington	C-17A	446th AW/OG	AMC	
317th AS (see Note 5)	JB Charleston, South Carolina	C-17A	315th AW/OG	AMC	
701st AS (see Note 5)	JB Charleston, South Carolina	C-17A	315th AW/OG	AMC	
709th AS (see Note 5)	Dover AFB, Delaware	C-17A	512th AW/OG	AMC	
728th AS (see Note 5)	JB Lewis-McChord, Washington	C-17A	446th AW/OG	AMC	
729th AS	March ARB, California	C-17A	452nd AMW/OG	AMC	
730th AMTS (see Note 6)	Altus AFB, Oklahoma	C-17A	507th ARW/OG	AETC	
732nd AS (see Note 5)	JB McGuire-Dix-Lakehurst, New Jersey	C-17A	514th AMW/OG	AMC	

1 10th AS will be inactivated during Fiscal 2016.

2 Squadron utilizes aircraft assigned to host wing.

3 Squadron operates C-17A as an associate to the co-located 535th AS.

4 Squadron operates C-17A as an associate to the co-located 517th AS.

5 Classic associate squadron utilizes aircraft assigned to host wing.

6 Associate squadron supports 97th AMW C-17 training operations.

## C-17A GLOBEMASTER III

McDonnell Douglas was selected as the winner of the C-X competition in August 1981 and, after a protracted development, the first C-17A flew in September 1991. Powered by four Pratt & Whitney F117-PW-100 turbofans, the C-17A is capable of conducting both inter- and intra-theater missions by delivering troops and cargo to main operating bases or directly to forward bases in the deployment area. It can operate from small, austere airfields and can take off and land on runways as short as 3,500ft (1,064m) and only 90ft wide (27.4m). It performs tactical airlift and air-drop missions when required. The aircraft has a maximum gross take-off weight of 585,000lb (265,352kg) and a maximum payload of 170,900lb (77,519kg). Recent upgrades have equipped the aircraft with the

large infra-red countermeasures (LAIRCM) and a new weather radar.

The first production model was delivered to Charleston AFB, South Carolina, in June 1993, and the C-17A achieved initial operational capability in January 1995. Boeing, which had acquired McDonnell Douglas in 1997, delivered the last of 223 Globemaster IIIs to the USAF at Charleston AFB in September 2013. Today the USAF's fleet of 222 C-17As is stationed at 14 locations and flown operationally by 11 active-duty, 10 AFRC and six ANG airlift squadrons. Two training, a flight test and a weapons squadron also fly the aircraft. Nine of the AFRC and two ANG squadrons are assigned to associate squadrons alongside active-duty squadrons.



A 436th AW C-17A from Dover AFB. **USAF/Greg L. Davis**



A 76th AS C-20H from Ramstein AB.  
Ashley Wallace

## C-20 GULFSTREAM III/IV

Selected to replace the USAF's C-140B Jetstar in June 1983, the USAF initially operated three leased C-20As, the first of which was delivered in September 1983. Purchased outright in 1985, the C-20As were supplemented by seven C-20Bs, with different electrical and avionics systems, and three C-20Cs with hardened communications systems. A pair of Gulfstream IVs was subsequently purchased and assigned the

designation C-20H. Rather than retaining the Gulfstream III's Rolls-Royce Spey turbofans, the C-20H is powered by more advanced Rolls-Royce Tay turbofan engines. Just four C-20Bs are currently used in the special air mission role by the 99th Airlift Squadron at Andrews AFB, Maryland, while both C-20Hs are stationed at Ramstein Air Base, Germany. One C-20B and all three C-20Cs are stored at Davis-Monthan AFB, Arizona.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
76th AS	Ramstein AB, Germany	C-20H	86th AW/OG	USAFE	
99th AS	JB Andrews-NAF Washington, Maryland	C-20B	89th AW/OG	AMC	

A 458th AS C-21A from Scott AFB. USAF

## C-21A

The Gates Learjet 35A business jet was selected in 1983 to replace the Rockwell CT-39A that provided high-priority, time-sensitive transportation for cargo and passengers. Initially taken on lease, the first of 80 C-21As was delivered in April 1984. At the conclusion of a five-year lease, the aircraft were purchased from Gates Learjet. Four more were bought for the

Air National Guard in 1986. The fleet, which provides priority cargo and passenger airlift for of the operational support airlift (OSA) mission, has been reduced to just 19 aircraft assigned to five units in the CONUS and in Germany. A further 23 C-21s are stored at Davis-Monthan AFB, Arizona, and the service has disposed of additional aircraft via General Services Administration (GSA) auctions.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 1, 375th OG (see Note 1)	Will Rogers World Airport, Oklahoma City, Oklahoma	C-21A	375th AW/OG	AMC	
76th AS	Ramstein AB, Germany	C-21A	86th AW/OG	USAFE	
457th AS	JB Andrews-NAF Washington, Maryland	C-21A	375th AW/OG	AMC	
458th AS (FTU)	Scott AFB, Illinois	C-21A	375th AW/OG	AMC	
Air National Guard units					
200th AS (see Note 2)	Peterson AFB, Colorado Springs, Colorado	C-21A	140th Wing	AMC	

<sup>1</sup> Unit conducts Combat Flight Inspection (CFIN) mission and operates NC-21A in support of the Air Force Flight Standards Agency (AFFSA).

<sup>2</sup> 140th Wing is ACC-gained.

The USAF operates a pair of VC-25As with the 89th AW. USAF

## VC-25A

Based on the Boeing 747-200B airliner, the VC-25A was acquired as a replacement for the VC-137C that served as the primary air transport for the President of the United States. Although externally similar to a standard 747, the VC-25A has been heavily modified. Powered by four General Electric CF6-80C2B1 turbofans, it features advanced electronics and communications equipment, a self-contained baggage loader, front and aft airstairs, and the capability for in-flight refueling. For self-defense, the aircraft has advanced electronic countermeasures equipment. Accommodation for the President include an executive suite that includes a stateroom (complete

with a dressing room, lavatory and shower) and the President's office. A conference/dining room is provided. Separate accommodation is provided for guests, senior staff, Secret Service and security personnel, and the news media.

Two VC-25As were purchased in 1982 but flew the first mission as 'Air Force One' in September 1990. Both aircraft are assigned to the 89th Airlift Wing's Presidential Airlift Group at Andrews AFB, Maryland, and are flown by dedicated aircrew from the Presidential Airlift Squadron. In January 2015 the USAF announced plans to replace the VC-25As with a new aircraft based on the 747-8. Modifications to the aircraft will begin in 2018 and they will enter service in 2023.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
PAS	JB Andrews-NAF Washington, Maryland	VC-25A	89th AW/PAG	AMC	

## RC-26B CONDOR

The USAF procured 11 Fairchild SA227AC Metroliners in 1986 for use as an Air National Guard operational support transport aircraft (ANGOSTA). Procurement switched to the C-26B, based on the SA227DC, and both models featured quick-change passenger, medical evacuation (medevac), or cargo interiors that allowed them to provide time-sensitive movement of personnel and cargo, as well as limited medevac.

Although the majority were divested, 11 aircraft equipped with a removable reconnaissance pod and operator station were retained.

Initially tasked with counter-drug (CD) missions, the RC-26B has taken on additional duties and now operates both in the US and overseas. Besides incident awareness and assessment (IAA) for disaster response, national special security events (NSSE), south-west border operations (SWB), and CD missions, the aircraft supports combatant command (COCOM) overseas contingency operations (OCO).

The pod-mounted systems were replaced by semi-permanent modifications that installed new sensors, communications equipment and aircraft survivability equipment. Although the aircraft are assigned to 11 different Air National Guard squadrons, plans call for the fleet to be consolidated with the Puerto Rico ANG.



An RC-26B of the 159th FS.  
Florida ANG



## C-32A/B

In August 1996, the USAF announced selection of the Boeing 757-200 extended-range aircraft as a replacement for its long-serving fleet of VC-137Cs in the special air mission (SAM) role. Designated the C-32A, the aircraft is tasked to carry the Vice-President, cabinet members and members of Congress traveling on government business, and is configured to carry 45 passengers and a crew of 16. The cabin includes a communications center, a fully-enclosed stateroom, conference

and staff facility and general seating with 32 business-class seats. The USAF accepted its first C-32A in June 1998, and four were assigned to the 89th Airlift Wing's 1st Airlift Squadron at Andrews AFB, Maryland. Three more 757-200s acquired from commercial sources in 2010 have joined the 89th. Two 757-200s are operated by the New Jersey Air National Guard under the designation C-32B and replaced a C-135C. Whereas the C-32A is powered by two Pratt & Whitney PW2040 engines, the C-32B features Rolls-Royce RB211s.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
1st AS	JB Andrews-NAF Washington, Maryland	C-32A	89th AW/OG	AMC	
486th FLTS	Eglin AFB, Florida	C-32B	AFMC	AFMC	
Air National Guard units					
150th SOS (see Note 1)	JB McGuire-Dix-Lakehurst, New Jersey	C-32B	108th Wing/OG	AFSOC	
1 AFSOC-gained squadron is assigned to ACC-gained wing.					



A C-32A of the 89th AW. Ashley Wallace

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Air National Guard units					
Det 1, 130th AS	Harrison/Marion Regional Airport, West Virginia	RC-26B	130th AW/OG	AMC	
100th FS	Montgomery Regional Airport-Dannelly Field, Alabama	RC-26B	187th FW/OG	ACC	
111th RS	Ellington Field JRB, Houston, Texas	RC-26B	147th RW/OG	ACC	
116th ARS	Fairchild AFB, Washington	RC-26B	141st ARW/OG	AMC	
138th ATKS	Syracuse Hancock International Airport, New York	RC-26B	174th ATKW/OG	ACC	
148th FS	Tucson International Airport, Arizona	RC-26B	162nd FW/OG	AETC	
153rd ARS	Meridian Regional Airport-Key Field, Mississippi	RC-26B	186th ARW/OG	AMC	
159th FS	Jacksonville International Airport, Florida	RC-26B	125th FW/OG	ACC	
176th FS	Dane County Regional Airport-Truax Field, Madison, Wisconsin	RC-26B	115th FW/OG	ACC	
188th SOS	Kirtland AFB, New Mexico	RC-26B	150th SOW/OG	AFSOC	
194th FS	Fresno-Yosemite International Airport/ANGB, California	RC-26B	144th FW/OG	ACC	

A C-37A of the 76th AS. USAF



## C-37A/B GULFSTREAM V/550

After declaring the Gulfstream V as the winner of its VC-X competition, the USAF ordered two of the long-range business jets in April 1997. Besides the initial pair, the \$70-million contract included options for the purchase of up to four additional aircraft. Because of the significant differences between the Gulfstream V and the earlier IIIs and IVs, in US service the aircraft was assigned the designation C-37A. Beginning in 1999, seven

further C-37As were acquired, and three Gulfstream 550s that followed received the designation C-37B. Operated from five locations, the fleet of nine C-37As and three C-37Bs provides priority airlift for senior government and military officials. They are powered by two BMW/Rolls-Royce BR710A1-10 or BR700-710C4-11 turbofans and offer a maximum range of 5,800nm (10,742km) and 6,750nm (12,501km) respectively.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
65th AS	JB Pearl Harbor-Hickam, Hawaii	C-37A	15th Wing/OG	PACAF	
76th AS	Ramstein AB, Germany	C-37A	86th AW/OG	USAFE	
99th AS	JB Andrews-NAF Washington, Maryland	C-37A/B	89th AW/OG	AMC	
309th AS	Chievres AB, Belgium	C-37A	86th AW/OG	USAFE	
310th AS (see Note 1)	MacDill AFB, Florida	C-37A	6th AMW/OG	AMC	
1 Aircraft are operated in support of USCENTCOM and USSOUTHCOM.					

### ABBREVIATIONS

JNGS	Joint National Guard Station	SOW	Special Operations Wing
JRB	Joint Reserve Base	TEG	Test and Evaluation Group
NAF	Naval Air Facility	TES	Test and Evaluation Squadron
NAS	Naval Air Station	TESTG	Test Group
NSA	Naval Support Activity	TPS	Test Pilot School
OG	Operations Group	TRS	Training Squadron
OS	Operations Squadron	TW	Test Wing
PACAF	Pacific Air Forces	USAF	United States Air Force
PAG	Presidential Airlift Group	USAF A	United States Air Force Academy
PAS	Presidential Airlift Squadron	USAFE	United States Air Forces Europe
RAF	Royal Air Force	USAFWC	USAF Weapons Center
RG	Reconnaissance Group	USAFWS	USAF Weapons School
RQG	Rescue Group	USCENTCOM	US Central Command
RQS	Rescue Squadron	USSOUTHCOM	US Southern Command
RQW	Rescue Wing		US Southern Command
RS	Reconnaissance Squadron	WEG	Weapons Evaluation Group
RSO	Remote Split Operations	WPS	Weapons Squadron
RW	Reconnaissance Wing	WRS	Weather Reconnaissance Squadron
SOG	Special Operations Group		
SOS	Special Operations Squadron		



## C-40B/C CLIPPER

A support aircraft for commanders, the C-40B entered service with the 89th Airlift Wing at Andrews AFB in January 2003. It is operated by a crew of 11 and carries up to 26 passengers. It differs from the US Navy's C-40A in being equipped with a VIP interior, winglets, and extended-range fuel tanks that combine to provide intercontinental range. Like the other special air mission (SAM) aircraft in the 89th AW, the C-40B is equipped with secure and voice and data capabilities. It has secure and non-secure wireless local area networks

(LAN) and internet access, and features direct-broadcast satellite television. Four C-40Bs were eventually acquired, and these are assigned to the 1st Airlift Squadron as well as the 65th AS at Joint Base Pearl Harbor-Hickam, Hawaii and the 76th AS at Ramstein Air Base, Germany. In September 2002, the District of Columbia ANG's 201st AS received the first of two C-40Cs as replacements for its C-22Bs. A third was delivered to the unit in 2009. Four new C-40Cs were later purchased and assigned to the AFRC's 932nd AW at Scott AFB, Illinois from February 2007.



A C-40B used for the Special Air Mission role. **USAF**

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
1st AS	JB Andrews-NAF Washington, Maryland	C-40B	89th AW/OG	AMC	
54th AS (see Note 1)	Scott AFB, Illinois	C-40C	375th AW/OG	AMC	
65th AS	JB Pearl Harbor-Hickam, Hawaii	C-40B	15th Wing/OG	PACAF	
76th AS	Ramstein AB, Germany	C-40B	86th AW/OG	USAFE	
Air National Guard units					
201st AS (see Note 2)	JB Andrews-NAF Washington, Maryland	C-40C	113th Wing/OG	AMC	
Air Force Reserve Command units					
73rd AS	Scott AFB, Illinois	C-40C	932nd AW/OG	AMC	

1 Active associate squadron shares C-40C aircraft with AFRC's 932nd AW.  
2 Wing is ACC-gained.

## KC-46A PEGASUS

In February 2011, the USAF selected the Boeing NewGen Tanker as the winner of its KC-X project and awarded the contractor a \$3.5-billion engineering and manufacturing development (EMD) contract that takes in the production of four developmental and 14 production aircraft. Assigned the designation KC-46A, the new multi-role tanker uses the airframe of Boeing's new 767-2C commercial freighter, which is based on the 767-200ER.

The first EMD aircraft conducted its initial flight in 767-2LK freighter configuration in December 2014, and the first fully-configured tanker flew when the second developmental aircraft took to the air at Paine Field, Everett on September 25,

2015. The USAF plans to purchase 179 new aerial refueling aircraft as part of the KC-X project and Boeing is scheduled to deliver the initial 18 by 2017. The current program will deliver 70 aircraft by the end of 2020.

Among the KC-46's multi-point refueling systems are a digital fly-by-wire boom capable of offloading fuel at a rate of 1,200 gallons (4,542 liters) per minute as well as a permanent centerline drogue system and removable wing air refueling pods.

In April 2014, the USAF announced that the first operational KC-46As will be based at McConnell Air Force Base in Wichita, Kansas. Pegasus crews will be trained at Altus Air Force Base, Oklahoma. Up to 10 operating bases are to be chosen for the KC-46 fleet.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 1, 418th FLT	King County International Airport/Boeing Field, Seattle, Washington	KC-46A	412th TW/OG	AFMC	



The KC-46A is now engaged in intensive flight trials. **Boeing/John D. Parker**

## C-130H HERCULES

The C-130 Hercules entered service in C-130A form in 1956. It is primarily tasked with tactical intra-theater missions that can require it to operate from unimproved landing strips and air-dropping troops and equipment. The cargo variants are often called upon to perform such diverse duties as aeromedical airlift, aerial spray missions, firefighting and ice re-supply. For the latter mission, specialized ski-equipped LC-130s support operations in the Arctic and Antarctic.

Although delivered in several versions, the oldest variant still in

service is the C-130H, more than 300 of which are operational in four basic versions. Under current plans the USAF will retire 28 C-130Hs by 2018, reducing the inventory to 300 airframes. The C-130H was adapted for numerous missions that included combat search and rescue, weather reconnaissance, special operations airlift, electronic warfare and as an aerial gunship. The HC-130N/P and MC-130P/H provided the capability to refuel rotary-wing aircraft in-flight and supported combat search and rescue (CSAR) and special operations missions. Although still flown by the ANG, the last AFSOC

MC-130Ps were retired in May 2015. Likewise, HC-130N/Ps remain in service with the ANG and AFRC but Air Combat Command retired its last examples in September 2015.

AFSOC phased out the first of its 19 MC-130H Combat Talon IIs during the same month, but the type is still operational with squadrons in Florida and Japan.

The EC-130H Compass Call is tasked with jamming enemy command and control communications and radar systems. This mission is referred to as command, control and communications countermeasures

(C3CM). The EC-130Hs have undergone numerous upgrades and 15 Block 35 EC-130Hs are operated by two active-duty squadrons.

The last AC-130H Spectre gunship was retired in May 2015 but AFSOC continues to operate the AC-130W Stinger II and purpose-built AC-130U Spooky. The first of those aircraft was retired in September 2015. Although AFSOC's fleet currently includes 28 AC-130Ws and AC-130Us, it plans to acquire 37 AC-130Js as replacements for the Stinger II and Spooky.



An AC-130U gunship.  
These will ultimately be  
replaced by AC-130Js.  
**USAF/SrA Julianne  
Showalter**



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
AATTC	Rosecrans Municipal Airport, St Joseph, Missouri	C-130H3	57th Wing/ USAFWS	ACC	
Det 2, 1st SOG	Hurlburt Field, Florida	AC-130J	1st SOW	AFSOC	
1st SOS	Kadena AB, Okinawa, Japan	MC-130H	353rd SOG	AFSOC	
2nd AS (see Note 1)	Pope AAF, Fort Bragg, North Carolina	C-130H	43rd AG	AMC	
4th SOS	Hurlburt Field, Florida	AC-130U	1st SOW/SOG	AFSOC	
9th SOS (see Note 1)	Cannon AFB, New Mexico	MC-130J	27th SOW/ SOG	AFSOC	
14th WPS (see Note 2)	Hurlburt Field, Florida	MC-130H/J/W, AC-130U/W	57th Wing/ USAFWS	ACC	
15th SOS	Hurlburt Field, Florida	MC-130H	1st SOW/SOG	AFSOC	
16th SOS	Cannon AFB, New Mexico	AC-130W	27th SOW/ SOG	AFSOC	
17th SOS	Kadena AB, Okinawa, Japan	MC-130J	353rd SOG	AFSOC	
19th SOS (FTU) (see Note 2)	Hurlburt Field, Florida	AC-130U, MC-130H	AFSOAWC	AFSOC	
29th WPS (see Note 2)	Little Rock AFB, Arkansas	C-130H/J	57th Wing/ USAFWS	ACC	
30th AS (see Note 3)	Cheyenne Municipal Airport, Wyoming	C-130H3	19th AW/OG	AMC	
34th WPS (see Note 4)	Nellis AFB, Nevada	HC-130J	AFSOAWC	ACC	FT
36th AS	Yokota AB, Japan	C-130H	374th AW/OG	PACAF	
37th AS	Ramstein AB, Germany	C-130J	86th AW/OG	USAFE	RS
39th AS	Dyess AFB, Texas	C-130J	317th AG	AMC	
40th AS	Dyess AFB, Texas	C-130J	317th AG	AMC	
41st AS	Little Rock AFB, Arkansas	C-130J	19th AW/OG	AMC	
41st ECS	Davis-Monthan AFB, Arizona	EC-130H	55th Wing/ ECG	ACC	DM
42nd ECS (FTU) (see Note 5)	Davis-Monthan AFB, Arizona	(No aircraft assigned)	55th Wing/ ECG	ACC	DM
43rd ECS	Davis-Monthan AFB, Arizona	EC-130H, TC-130H	55th Wing/ ECG	ACC	DM
48th AS (FTU)	Little Rock AFB, Arkansas	C-130J	314th AW/OG	AETC	
50th AS (see Note 6)	Little Rock AFB, Arkansas	C-130H2	19th AW/OG	AMC	
52nd AS (see Note 7)	Peterson AFB, Colorado	C-130H3	19th AW/OG	AMC	
61st AS	Little Rock AFB, Arkansas	C-130J	19th AW/OG	AMC	
62nd AS (FTU) (see Note 8)	Little Rock AFB, Arkansas	C-130H2	314th AW/OG	AETC	
67th SOS	RAF Mildenhall, Suffolk, UK	MC-130J	352nd SOW/752nd SOG	AFSOC	

71st RQS	Moody AFB, Georgia	HC-130J	23rd Wing/347th RQG	ACC	FT
79th RQS	Davis-Monthan AFB, Arizona	HC-130J	23rd Wing/563rd RQG	ACC	FT
88th TES (see Note 9)	Nellis AFB, Nevada	HC-130J	53rd Wing/ TEG	ACC	OT
413th FLTS (see Note 1)	Hurlburt Field, Florida	MC-130H, AC-130U/J	96th TW/OG	AFMC	
415th SOS	Kirtland AFB, New Mexico	HC/MC-130J	58th SOW/OG	AETC	
550th SOS	Kirtland AFB, New Mexico	HC-130N, MC-130H	58th SOW/OG	AETC	
550th SOS (FTU) (see Note 1)	Cannon AFB, New Mexico	AC-130W	AFSOAWC	AFSOC	
<b>Air National Guard units</b>					
102nd RQS	Francis S. Gabreski Airport/ANGB, Westhampton Beach, New York	HC-130N/P	106th RQW/ OG	ACC	
109th AS	Minneapolis St Paul International Airport/ARS, Minnesota	C-130H3	133rd AW/OG	AMC	
115th AS	NB Ventura County/Point Mugu-Channel Islands ANG, California	C-130J	146th AW/OG	AMC	
118th AS	Bradley International Airport/ANGB, Windsor Locks, Connecticut	C-130H	103rd AW/OG	AMC	
130th AS	Yeager Airport, Charleston, West Virginia	C-130H2/3	130th AW/OG	AMC	
130th RQS	Moffett Federal Airport ANG, California	MC-130P	129th RQW/ OG	ACC	CA
139th AS	Schenectady County Airport/ Stratton ANG, Scotia, New York	C-130H2, LC-130H2/3, LC-130R	109th AW/OG	AMC	
142nd AS	New Castle County Airport, Delaware	C-130H2	166th AW/OG	AMC	
143rd AS	Quonset State Airport/Holland ANGB, North Kingston, Rhode Island	C-130J	143rd AW/OG	AMC	
144th AS	JB Elmendorf-Richardson, Alaska	C-130H2	176th Wing/ OG	PACAF	AN
154th TRS (FTU)	Little Rock AFB, Arkansas	C-130H2	189th AW/OG	AETC	
156th AS	Charlotte Douglas International Airport, North Carolina	C-130H3	145th AW/OG	AMC	



## C-130J HERCULES

The C-130J, a follow-on to the C-130H, first flew in April 1996. Among its many features, the aircraft has new Rolls-Royce AE2100D3 turboprops with six-blade propellers and a 'glass' cockpit. The USAF took possession of its first advanced C-130J in January 1999 and more than 100 airlifters are now in service. The initial 12 aircraft were delivered with the standard-length fuselage, but two were later converted for electronic warfare missions. Rolled out in January 2001, the first stretched C-130J-30 was delivered to the Rhode Island Air National Guard in December 2001. All subsequent airlifters have been delivered in the C-130J-30 configuration with a 15ft (4.6m)-longer fuselage.

Whereas the C-130H and C-130J are both capable of carrying six cargo pallets, 74 litters, 16 container delivery system (CDS) bundles, 92 combat troops or 64 paratroopers, the C-130J-30 can take up to eight pallets, 97 litters, 24 CDS bundles, 128 combat troops or 92 paratroopers. The C-130J is operated by a crew of three, two pilots and loadmaster, and does not need a navigator or flight engineer and loadmaster like the C-130H.

Ten additional C-130J airframes were modified for weather reconnaissance and another five for electronic missions. The first WC-130J was delivered to AFRC in September 1999, and the initial EC-130J Commando Solo to the Pennsylvania ANG's 193rd Special Operations Squadron

in October 1999. The WC-130J penetrates tropical cyclones and hurricanes in order to collect weather data from within the storm. Tasked as an airborne military information support operations (MISO) broadcast platform, the EC-130J conducts information and psychological operations (PSYOP) and civil affairs broadcast missions over numerous radio and television and military communications bands. Operated on behalf of Air Force Special Operations Command (AFSOC), the fleet of seven EC-130Js includes three EC-130J(CS) Commando Solo and four EC-130J(SJ) Super-J aircraft. The EC-130J(SJ) is a 'slick' airframe utilized for the 'SOF FLEX' mobility missions including special operations forces airlift (SOFLIFT),

military free-fall (MFF), Joint Precision Air Drop System (JPADS), and PSYOP leaflet drops.

Development of the HC-130J combat rescue and MC-130J special operations models began in June 2008. Intended to succeed the HC-130N/P and MC-130E/H/P, these are based on the same airframe as the US Marine Corps' KC-130J. The first HC-130J flew in July 2010 and the MC-130J followed in April 2011. More than 50 examples of the two variants are in service.

The MC-130J serves as the baseline for a planned fleet of 37 AC-130J gunships. Flight-testing began at Eglin AFB, Florida, in January 2013. Nicknamed 'Ghost rider', the AC-130J features a GAU-23 30mm cannon and precision-guided munitions.

158th AS (see Note 10)	Savannah Hilton Head International Airport, Georgia	C-130H2/H3	165th AW/OG	AMC	
164th AS	Mansfield Lahm Airport, Ohio	C-130H2	179th AW/OG	AMC	
165th AS	Louisville International Airport- Standiford Field, Kentucky	C-130H2	123rd AW/OG	AMC	
169th AS	General Downing-Peoria International Airport, Illinois	C-130H3	182nd AW/ OG	AMC	
180th AS	Rosecrans Memorial Airport, St Joseph, Missouri	C-130H2/H2.5	139th AW/OG	AMC	
181st AS	NAS JRB Fort Worth/Carswell Field, Texas	C-130H2	136th AW/OG	AMC	
186th AS	Great Falls International Airport, Montana	C-130H	120th AW/OG	AMC	
187th AS	Cheyenne Municipal Airport, Wyoming	C-130H3	153rd AW/OG	AMC	
192nd AS	Reno Tahoe International Airport/May ANGB, Nevada	C-130H	152nd AW/ OG	AMC	
193rd SOS	Harrisburg International Airport, Pennsylvania	EC-130J	193rd SOW/ OG	AFSOC	
198th AS (see Note 11)	Luis Muñoz Marín International Airport/Muñiz ANGB, Puerto Rico	C-130H	156th AW/OG	AMC	
211th RQS	JB Elmendorf- Richardson, Alaska	HC-130N	176th Wing/ OG	PACAF	
<b>Air Force Reserve Command units</b>					
5th SOS (see Note 12)	Hurlburt Field, Florida	AC-130U	919th SOW/ SOG	AFSOC	
39th RQS	Patrick AFB, Florida	HC-130N/P	920th RQW/ OG	ACC	FL
53rd WRS	Keesler AFB, Mississippi	WC-130J	403rd Wing/ OG	AMC	
95th AS	Pope AAF, Fort Bragg, North Carolina	C-130H2	440th AW/OG	AMC	

96th AS	Minneapolis-St Paul International Airport/JARS, Minnesota	C-130H3	934th AW/OG	AMC	
327th AS	Little Rock AFB, Arkansas	C-130H2	913th AG	AMC	
328th AS	Niagara Falls International Airport/JARS, New York	C-130H2	914th AW/OG	AMC	
357th AS	Maxwell-Gunter AFB, Alabama	C-130H2	908th AW/OG	AMC	
700th AS	Dobbins ARB, Georgia	C-130H3	94th AW/OG	AMC	
731st AS	Peterson AFB, Colorado	C-130H3	302nd AW/ OG	AMC	
757th AS	Youngstown Warren Regional Airport/JARS, Ohio	C-130H2	910th AW/OG	AMC	
758th AS	Pittsburgh International Airport/JARS, Pennsylvania	C-130H2	911th AW/OG	AMC	
815th AS	Keesler AFB, Mississippi	C-130J	403rd Wing/ OG	AMC	
<p>1 Active associate squadron shares aircraft with AFRC's co-located 440th AW, to be re-designated 43rd Air Mobility Operations Group on 1 October 2015.</p> <p>2 Squadron utilizes aircraft assigned to host wing.</p> <p>3 Squadron operates C-130H3 as an active associate to ANG's co-located 153rd AW. Squadron will be inactivated.</p> <p>4 34th WPS utilizes HC-130Js operated by the 79th RQS at Davis-Monthan AFB, Arizona.</p> <p>5 Squadron utilizes EC-130H assigned to the 41st and 43rd ECS in support of FTU mission.</p> <p>6 Squadron operates C-130H2 as an active associate to AFRC's co-located 327th AS.</p> <p>7 Squadron operates C-130H3 as an active associate to AFRC's co-located 302nd AW. Squadron will be inactivated.</p> <p>8 Active associate squadron conducts FTU mission alongside 189th AW/154th TRS.</p> <p>9 Combat Search and Rescue Combined Task Force (CSAR/CTF). Squadron is located at Nellis AFB but HC-130J based at Davis-Monthan AFB, Arizona.</p> <p>10 158th AS will exchange C-130H2 for two C-130H2.5 and six C-130H3 aircraft.</p> <p>11 Squadron is scheduled to convert to RC-26B.</p> <p>12 Associate unit, shares aircraft with co-located active-duty squadron, which supports AFSOTC/19th SOS training efforts.</p>					



A new HC-130J Combat King II assigned to the 347th Rescue Group at Moody AFB. **Lockheed Martin**





## KC-135R/T STRATOTANKER, NC-135W, OC-135B, RC-135S/U/V/W, TC-135S/W, WC-135C/W

The USAF purchased its first KC-135A aerial refueling aircraft from Boeing in 1954. The tanker, based on the Model 367-80, first flew in August 1956 and the initial production Stratotanker was delivered to Castle Air Force Base, California, in June 1957. The last of more than 730 KC-135s joined the Air Force in 1965. Originally powered by Pratt & Whitney J57 turbojets, more than 150 KC-135As and KC-135Ds were re-engined with Pratt & Whitney TF33-PW-102 turbofans as the KC-135E, while General Electric CFM56 (F108-GE-100) turbofans were installed on more than 420 KC-135A and KC-135Q models that were assigned the designations KC-135R and KC-135T respectively. The latter versions were capable of offloading 50 per cent more fuel, were 25 per cent more fuel-efficient, cost 25 per cent less to operate and were 96 per cent quieter than the KC-135A. Although the last KC-135Es were retired in 2009, around 400 KC-135R/Ts remain in service with active-duty units, the ANG and AFRC.

A number of KC-135Rs were equipped with a multi-point

refueling system (MPRS) that installed Flight Refueling Limited (FRL) Mk32B pods under the wings. The hose-and-drogue air refueling pods provide greater flexibility in refueling NATO and US Navy aircraft not compatible with the Stratotanker's flying boom.

The Stratotanker airframe lent itself to numerous modifications, resulting in the production of weather reconnaissance, electronic intelligence and command post variants. The USAF received 30 C-135B Stratolifters that were powered by TF33 turbofans — nearly all of these aircraft were later modified for specific missions. Today the specialized versions, which include the OC-135B, RC-135S, RC-135U, RC-135V, RC-135W, WC-135C and WC-135W, are all assigned to the 55th Wing at Offutt AFB, Nebraska.

A pair of OC-135B Open Skies observation aircraft support the Open Skies Treaty that permits short-notice, unrestricted aerial observation flights over the territory of any of the participating nations.

Three RC-135S Cobra Ball aircraft are tasked to collect optical

Squadron	Location	Aircraft	Wing/Group	Command	
38th RS	Offutt AFB, Nebraska	RC-135V/W, TC-135W	55th Wing/OG	ACC	OF
45th RS	Offutt AFB, Nebraska	WC-135W, OC-135B, RC-135S/U, TC-135S	55th Wing/OG	ACC	OF
Det 45th RS	Eielson AFB, Alaska	RC-135S	55th Wing/OG	ACC	OF
54th AS (FTU)	Altus AFB, Oklahoma	KC-135R	97th AMW/OG	AETC	
64th ARS (see Note 1)	Pease ANGB, Portsmouth International Airport, New Hampshire	KC-135R	22nd ARW/OG	AMC	
82nd RS	Kadena AB, Okinawa	RC-135V/W	55th Wing/OG	ACC	OF
91st ARS	MacDill AFB, Florida	KC-135R/T	6th AMW/OG	AMC	
92nd ARS	Fairchild AFB, Washington	KC-135R/T	92nd ARW/OG	AMC	
93rd ARS	Fairchild AFB, Washington	KC-135R/T	92nd ARW/OG	AMC	
95th RS	RAF Mildenhall, Suffolk, UK	RC-135V/W	55th Wing/OG	ACC	OF
Det 1, 95th RS	NSA Souda Bay AB, Crete, Greece	RC-135V/W	55th Wing/OG	ACC	OF
99th ARS (see Note 2)	Birmingham-Shuttlesworth International Airport, Alabama	KC-135R	6th AMW/OG	AMC	
338th CTS (FTU)	Offutt AFB, Nebraska	(RC/WC/OC-135 training)	55th Wing/OG	ACC	OF
343rd RS	Offutt AFB, Nebraska	RC-135V/W, TC-135W	55th Wing/OG	ACC	OF
344th ARS	McConnell AFB, Kansas	KC-135R/T	22nd ARW/OG	AMC	
349th ARS	McConnell AFB, Kansas	KC-135R/R(T)	22nd ARW/OG	AMC	
350th ARS	McConnell AFB, Kansas	KC-135R	22nd ARW/OG	AMC	
351st ARS	RAF Mildenhall, Suffolk, UK	KC-135R/T	100th ARW/OG	USAFE	
384th ARS	McConnell AFB, Kansas	KC-135R/R(T)	22nd ARW/OG	AMC	
418th FLT5	Edwards AFB, California	KC-135R	412th TW/OG	AFMC	
509th WPS (see Note 3)	Fairchild AFB, Washington	KC-135R	57th Wing/USAFWS	ACC	



645th AESG	Majors Field Greenville Municipal Airport, Texas	NC-135W	645th AESG (see Note 4)	AFMC	
906th ARS (see Note 5)	Scott AFB, Illinois	KC-135R	305th AMW/OG	AMC	
909th ARS	Kadena AB, Okinawa	KC-135R/T	18th Wing/OG	PACAF	
911th ARS (see Note 6)	Seymour Johnson AFB, North Carolina	KC-135R	6th AMW/OG	AMC	
912th ARS (see Note 7)	March ARB, California	KC-135R	92nd ARW/OG	AMC	
Air National Guard units					
106th ARS	Birmingham-Shuttlesworth International Airport, Alabama	KC-135R	117th ARW/OG	AMC	
108th ARS	Scott AFB, Illinois	KC-135R	126th ARW/OG	AMC	
116th ARS (see Note 8)	Fairchild AFB, Washington	KC-135R	141st ARW/OG	AMC	
117th ARS	Forbes Field Airport, Topeka, Kansas	KC-135R	190th ARW/OG	AMC	
126th ARS	Gen. Mitchell International Airport/ARS, Milwaukee, Wisconsin	KC-135R	128th ARW/OG	AMC	
132nd ARS	Bangor International Airport, Maine	KC-135R	101st ARW/OG	AMC	
133rd ARS	Pease ANGB Portsmouth International Airport, New Hampshire	KC-135R	157th ARW/OG	AMC	
141st ARS	JB McGuire-Dix-Lakehurst, New Jersey	KC-135R	108th Wing/OG	AMC	
146th ARS	Pittsburgh International Airport, Pennsylvania	KC-135T	171st ARW/OG	AMC	
147th ARS	Pittsburgh International Airport, Pennsylvania	KC-135T	171st ARW/OG	AMC	
151st ARS	McGhee Tyson Airport/ANGB, Knoxville, Tennessee	KC-135R	134th ARW/OG	AMC	
153rd ARS	Meridian Regional Airport-Key Field, Mississippi	KC-135R	186th ARW/OG	AMC	
166th ARS	Rickenbacker International Airport/ANGB, Columbus, Ohio	KC-135R	121st ARW/OG	AMC	
168th ARS	Elison AFB, Alaska	KC-135R	168th ARW/OG	PACAF	
171st ARS	Selfridge ANGB, Mount Clemens, Michigan	KC-135T	127th Wing/OG	AMC	
173rd ARS	Lincoln Municipal Airport/ANGB, Nebraska	KC-135R	155th ARW/OG	AMC	
174th ARS	Sioux Gateway Airport/COL. Bud Day Field, Sioux City, Iowa	KC-135R	185th ARW/OG	AMC	
191st ARS	Roland R. Wright ANGB/Salt Lake City International Airport, Utah	KC-135R	151st ARW/OG	AMC	
197th ARS	Phoenix Sky Harbor International Airport, Arizona	KC-135R	161st ARW/OG	AMC	
203rd ARS	JB Pearl Harbor-Hickam, Hawaii	KC-135R	154th Wing/OG	PACAF	
238th CTS (FTU) (see Note 9)	Offutt AFB, Nebraska	RC/WC/OC-135	170th Group	ACC	OF

Air Force Reserve Command units					
18th ARS (see Note 10)	McConnell AFB, Kansas	KC-135R	507th ARW/931st ARG	AMC	
63rd ARS	MacDill AFB, Florida	KC-135R	927th ARW/OG	AMC	
72nd ARS	Grissom ARB, Indiana	KC-135R	434th ARW/OG	AMC	
74th ARS	Grissom ARB, Indiana	KC-135R	434th ARW/OG	AMC	
77th ARS	Seymour Johnson AFB, North Carolina	KC-135R	916th ARW/OG	AMC	
336th ARS	March ARB, California	KC-135R	452nd AMW/OG	AMC	
465th ARS	Tinker AFB, Oklahoma	KC-135R	507th ARW/OG	AMC	
730th AMTS (see Note 11)	Altus AFB, Oklahoma	KC-135R	507th ARW/OG	AETC	
756th ARS	JB Andrews-NAF Washington, Maryland	KC-135R	459th ARW/OG	AMC	

- 1 Active associate squadron shares aircraft assigned to the ANG's co-located 157th ARW.  
2 Active associate squadron shares aircraft assigned to the ANG's co-located 117th ARW.  
3 Squadron utilizes aircraft assigned to host wing.  
4 645th AESG is based at Wright-Patterson AFB, Ohio.  
5 Active associate squadron shares aircraft assigned to the ANG's co-located 126th ARW.  
6 Active associate squadron shares aircraft assigned to the AFRC's co-located 916th ARW.  
7 Active associate squadron shares aircraft assigned to the AFRC's co-located 452nd AMW.  
8 Air National Guard associate unit shares aircraft assigned to the 92nd ARW.  
9 Associate squadron operates alongside 55th Wing's 338th CTS.  
10 Associate unit shares aircraft assigned to the 22nd ARW.  
11 Associate unit supports 97th AMW KC-135 and C-17 training operations.

and electronic data on ballistic targets that are critical to arms treaty compliance verification, as well as the development of US strategic defense and theater missile defense concepts. Two RC-135U Combat Sent platforms conduct strategic electronic reconnaissance that is primarily directed at radar signals intelligence (SIGINT) and eight RC-135V and nine RC-135W Rivet Joint aircraft perform electronic intelligence (ELINT) missions. Although based at Offutt, the aircraft are regularly detached to forward operating locations worldwide.

Single examples of the WC-135C and WC-135W Constant Phoenix atmospheric collection aircraft continue to support the limited nuclear test ban treaty of 1963 by collecting air samples in order to detect the presence of radioactive particles.

Trainer variants include a single TC-135S and two TC-135Ws. A single NC-135W is assigned to AFMC and supports the development of upgrades for the Rivet Joints. Whereas the OC-135B, WC-135C and WC-135W retain the TF33 engines, the remainder of the aircraft have been re-engined with F108 turbofans.

Besides engine upgrades, the '135' fleet was modified under the Pacer-CRAG (compass, radar and GPS) program, which eliminated the need for a navigator position. The KC-135 global air traffic management (GATM) program later upgraded the communication, navigation, surveillance and air Traffic management (CNS/ATM) systems to 419 Stratotankers and other C-135 derivatives as part of an effort that was completed in 2011.

Rockwell Collins began development of the KC-135 Block 45 program, which will provide the aircraft with a new autopilot, flight director, radar altimeter and electronic engine instrument display in September 2009. Testing associated with Block 45 was completed in April 2013 and the 22nd Air Refueling Wing at McConnell AFB, Kansas flew the first operational mission with an aircraft equipped to this standard in 2015. The modifications will be completed in 2025.

**Page 87:** A 92nd ARW KC-135R refuels an F-16C of the 18th AGRS. **USAF**

**Right:** An RC-135W Rivet Joint of the 55th Wing. **USAF**





C-145A SKYTRUCK

In February 2009, Air Force Special Operations Command (AFSOC) confirmed plans to procure 10 M28-05 Skytrucks from PZL Mielec. The type was intended to provide AFSOC with the ability to shuttle small groups of special operators to areas with unimproved landing strips. It accepted its first aircraft from the Sierra Nevada Corporation in August 2009.

Considered a non-standard aviation (NSAv) Light asset, the M28s were assigned to the 27th Special Operations Wing's 318th Special Operations Squadron at

Cannon AFB, New Mexico. The project was later expanded to include 16 aircraft and the last M28 was delivered to Cannon AFB in March 2012. The aircraft, which received the designation C-145A in May 2012, were later transferred to the Aviation Foreign Internal Defense (AvFID) mission and re-assigned to Duke Field in Florida. The last example left Cannon in March 2013. Between May and August 2015, 10 of the surviving Skytrucks were placed in storage by the 309th Aerospace Maintenance and Regeneration Group (AMARG) at Davis-Monthan AFB, Arizona.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
6th SOS	Duke Field, Florida	C-145A	AFSOAWC	AFSOC	
Air Force Reserve Command units					
5th SOS (see Note 1)	Hurlburt Field, Florida	C-145A	919th SOW/SOG	AFSOC	
711th SOS (see Note 2)	Duke Field, Florida	C-145A	919th SOW/SOG	AFSOC	
1 Associate unit, shares aircraft with co-located active-duty squadron, which supports AFSOTC/19th SOS Combat Aviation Advisor (CAA) training efforts.					
2 711th SOS operates as an associate squadron and supports the 6th SOS training mission.					

C-146A WOLFHOUND

USAF procurement of the aircraft now known as the Wolfhound began in Fiscal 2010, and the Sierra Nevada Corporation delivered an initial pair of Dornier 328-110s to Air Force Special Operations Command (AFSOC) in 2011. The aircraft were assigned to the 27th Special Operations Wing's 524th Special Operations Squadron at Cannon AFB, New Mexico, replacing leased de Havilland Canada DHC-8 Dash 8s.

Considered to be part of AFSOC's non-standard aviation (NSAv) Medium fleet, the aircraft were initially operated under their civil designations. A total of 17 examples were eventually acquired, and the Mission Design

Series (MDS) designation C-146A was assigned to the type during May 2012.

The twin-engine, high-wing monoplane is powered by two Pratt & Whitney Canada PW119C turboprop engines and is capable of carrying up to 32 passengers.

US Special Operations Command (USSOCOM) fielded two or three NSAv aircraft to each Theater Special Operations Command (TSOC), and C-146s are deployed in support of US Southern (SOUTHCOM), Central (CENTCOM), Africa (AFRICOM), and Pacific (PACOM) Commands.

Under current plans, six additional C-146As will be acquired by Fiscal 2019.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
524th SOS	Cannon AFB, New Mexico	C-146A	27th SOW/SOG	AFSOC	
551st SOS (FTU) (see Note 1)	Cannon AFB, New Mexico	C-146A	AFSOAWC	AFSOC	
1 551st SOS utilizes aircraft borrowed from the 524th SOS.					





Squadron	Location	Aircraft	Wing/Group	Command	Tail code
960th AACs	Tinker AFB, Oklahoma	E-3G	552nd ACW/OG	ACC	OK
961st AACs	Kadena AB, Okinawa	E-3B/C	18th Wing/OG	PACAF	ZZ
962nd AACs	JB Elmendorf-Richardson, Alaska	E-3B/C	3rd Wing/OG	PACAF	AK
963rd AACs	Tinker AFB, Oklahoma	E-3B/C	552nd ACW/OG	ACC	OK
964th AACs	Tinker AFB, Oklahoma	E-3B/C/G	552nd ACW/OG	ACC	OK
965th AACs	Tinker AFB, Oklahoma	E-3B/C	552nd ACW/OG	ACC	OK
966th AACs (FTU)	Tinker AFB, Oklahoma	E-3B/C	552nd ACW/OG	ACC	OK
Det 1, 605th TES (see Note 1)	Boeing Field, Seattle, Washington	E-3	505th CCW/TEG	ACC	
Air Force Reserve Command units					
970th AACs (see Note 1)	Tinker AFB, Oklahoma	E-3B/C	513th ACG	ACC	OK
<b>1</b> 605th TES and 505th CCW are located at Hurlburt Field, Florida. 505th TEG is located at Nellis AFB, Nevada and conducts Operational Test of ISR weapons systems. <b>2</b> Unit operates E-3B/C/G as an associate to the 552nd ACW.					

## E-3B/C/G SENTRY

The Sentry Airborne Warning and Control System (AWACS) aircraft is a battle management command and control (BMC2) weapon system. Ongoing modernization efforts are focused on upgrading the battle management mission systems, combat identification and the cockpit avionics suite.

The modified Boeing 707-320 airframe is equipped with a 30ft (9.1m) rotating radar antenna that allows its AN/APY-1/2 long-range surveillance radar to locate low-flying targets at a range of more than 200 miles (320km).

Deliveries to Tinker AFB, Oklahoma began in March 1977. Boeing supplied the last of 34

such aircraft to the USAF in 1984.

The final nine examples, as well as the first production E-3A, were equipped with the AN/APY-2 radar that provided improved maritime capabilities. Later upgrades standardized the aircraft configuration, the first 24 E-3As being upgraded and designated as the E-3B, and the remainder as E-3Cs.

Upgrades for the Sentry added a passive sensor in the form of the AN/AYR-1 electronic support measures system, a GPS navigation capability, upgraded secure datalink communications and an upgraded central computer. A separate radar system improvement program (RSIP) replaced the radar computer,

upgraded the radar operator consoles, other selected radar system hardware, and radar sub-system software, to improve pulse-Doppler radar sensitivity.

The Block 40/45 upgrade, which is the largest in the history of the AWACS program, replaces the mission computing system with open-architecture, commercial off-the-shelf (COTS) hardware that includes new mission computing hardware and software, mission consoles, and upgraded electronic support measures equipment and allows on-board and off-board sensor inputs to be fused. Modification of the first aircraft to Block 40/45 configuration began in November 2010 and the first E-3G was rolled out on August 2011. The newest variant achieved initial operational capability in July 2015. Additional upgrades will provide a major cockpit avionics

modification that replaces most analog indicators with five modern digital multi-color 'glass' displays. Additionally, this modernization will eliminate the need for a navigator, reducing the flight crew from four to three.

The first aircraft to be updated under the diminishing manufacturing sources replacement of avionics for global operations and navigation (DRAGON) program is scheduled to be returned to the 552nd Air Control Wing at Tinker in 2017. The Air Force expected its fleet of DRAGON-enabled E-3s to be delivered by the fourth quarter of Fiscal 2025.

Although plans call for 31 aircraft to be upgraded to E-3G configuration by 2020, as part of its Fiscal 2016 budget the USAF announced plans to retire seven Sentries in Fiscal 2019.

An E-3B AWACS of the 552nd ACW. **Jamie Hunter**



## E-8C JOINT STARS

In September 1985, Grumman Aerospace was awarded a contract for two E-8A developmental airborne battle management aircraft equipped with the Joint Surveillance and Target Acquisition Radar System

(Joint STARS). Although still under development, the aircraft deployed to support Operation 'Desert Storm' in 1991.

The aircraft use synthetic aperture radar (SAR) and ground moving target indicator (GMTI) modes. The most prominent

external feature is a 40ft (12m)-long, canoe-shaped radome under the forward fuselage that houses the side-looking phased array antenna for the AN/APY-7 radar.

Northrop Grumman delivered the first operational E-8C in June 1996 and the last of 17 aircraft

arrived at Robins AFB, Georgia, in April 2005.

Plans to re-engine the E-8Cs with Pratt & Whitney JT8D-219s were cancelled after one aircraft was modified. The USAF plans to acquire 16 new business jet-class replacements for the E-8C.



An E-8C Joint STARS of the 461st ACW. **USAF**

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
12th ACCS (see Note 1)	Robins AFB, Georgia	E-8C	461st ACW/OG	ACC	GA
16th ACCS (see Note 1)	Robins AFB, Georgia	E-8C	461st ACW/OG	ACC	GA
330th CTS (FTU) (see Note 1)	Robins AFB, Georgia	TE-8A, E-8C	461st ACW/OG	ACC	GA
Det 2, 605th TES (see Note 2)	Melbourne International Airport, Florida	E-8C	505th CCW/TEG	ACC	
Air National Guard units					
128th ACCS	Robins AFB, Georgia	E-8C	116th ACW/OG	ACC	GA
<b>1</b> Active associate squadron utilizes aircraft assigned to the Georgia Air National Guard's 116th ACW. <b>2</b> 605th TES and 505th CCW are located at Hurlburt Field, Florida. 505th TEG is located at Nellis AFB, Nevada and conducts operational test of ISR weapons systems.					



The E-4B acts as an airborne command post. **USAF**

## E-4B

First flown as the E-4A in June 1973, the E-4B is based on the Boeing 747-200B airframe and is powered by four General Electric CF6-50E2 turbofans. The aircraft has served as the National Airborne Operations Center (NAOC) for the National Command Authorities (NCA) since the first E-4A entered service December 1974. The first E-4B, with upgraded systems, was delivered in January 1980, and by January 1985 the three earlier E-4As were modified to that standard.

The E-4B was designed to provide US forces with a modern, highly survivable command, control and communications

center in the event of a national emergency or destruction of ground command control centers. The aircraft execute emergency war orders and are tasked to support the Federal Emergency Management Agency (FEMA) by co-ordinating actions of civil authorities in the event of a natural emergency. The E-4B crew can include up to 114 people, including a joint-service operations team, an Air Combat Command flight crew, maintenance and security component, and communications team. One E-4B and a crew of 63 personnel are generally on 24-hour ground alert to provide direct support for the NCA.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
1st ACCS	Offutt AFB, Nebraska	E-4B	55th Wing/OG	ACC	

## E-9A 'WIDGET'

Air Combat Command's 53rd Weapon Evaluation Group at Eglin AFB, Florida operates two de Havilland Canada DHC-8s modified by Sierra Research for service as range support aircraft. Assigned the designation E-9A, the type entered service in 1988.

Assigned to the 82nd Aerial Targets Squadron, the aircraft,

which operate from Tyndall AFB, Florida, are equipped with an AN/APS-143(V)1 airborne sea surveillance radar and a phased array antenna that simultaneously receives, records and downlinks telemetry from aircraft missiles and other sources. The E-9A provides an over-the-horizon ultra-high frequency command, initiate and destruct relay system.

The E-9As are assigned to the 82nd ATRS, **USAF/MSgt Michael Ammons**



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
82nd ATRS	Tyndall AFB, Florida	E-9A	53rd Wing/53rd WEG	ACC	TD

## E-11A

Northrop Grumman initially tested the Battlefield Airborne Communications Node (BACN) aboard a BD700 Global Express test aircraft from August 2007. It was deployed to Afghanistan in late 2008. The BACN provides the capability to relay voice communication over long distances and an airborne data relay that allows real-time information exchanges between

tactical datalink systems. It extends the range of datalinks across the theater of operations.

In 2009, Northrop Grumman integrated the BACN on two Global Express XRS aircraft that were deployed to Afghanistan. Originally leased from Northrop Grumman, the aircraft were purchased by the USAF in 2011 and the designation E-11A was assigned. A fourth E-11A joined the Air Force's fleet in late 2013.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
430th EECS	Kandahar Airport, Afghanistan	E-11A		ACC	

An E-11A BACN communications relay aircraft. **USAF**

## QF-4E/G, QRF-4C PHANTOM II

The last operational USAF F-4Gs were retired in April 1996. The Phantom was selected as the USAF's next full-scale aerial target (FSAT) in February 1992 and Tracor Flight Systems Inc (now BAE Systems Flight Systems Inc) was awarded a development contract to convert three RF-4Cs, five F-4Es and two F-4Gs to drone configuration.

The first live shoot-down occurred in April 1997, and in January 1998 the QF-4E/G replaced the QF-106A/B as the USAF's FSAT. Besides FSAT

operations, the QF-4s are capable of manned operation and are often employed for weapon/electronic countermeasures development testing and as manned targets. In November 2013, the last of 314 converted QF-4s was delivered to Tyndall AFB, Florida. Operation of the QF-4 came to a close at Tyndall on May 27, 2015 when the final FSATs launched from the base's drone runway. Although replaced by QF-16s at the Florida base, the FSATs continue to operate from Holloman AFB, New Mexico.

A QRF-4C of the 82nd ATRS. **USAF**

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 1, 82nd ATRS	Holloman AFB, New Mexico	QRF-4C, QF-4E/G	53rd Wing/53rd WEG	ACC	HD





F-15E Strike Eagles of the 366th Fighter Wing. **Jamie Hunter**

## F-15C/D EAGLE, F-15E STRIKE EAGLE

The first full-scale development (FSD) F-15A Eagle flew inaugurally in July 1972. The initial production aircraft entered service at Luke AFB, Arizona in November 1974, and the type reached initial operating capability (IOC) in July 1975. The 1st TFW was established during 1977 as the first combat-coded operator of the dedicated air superiority fighter. Beginning in 1979, production

switched to the more capable F-15C/D variant.

The USAF plans to retain around 196 F-15s in service until at least 2040, and planned upgrades will provide the fighters with new systems allowing them to operate alongside the later F-22A and F-35A. As part of those modifications, the current mechanically-scanned radars that equip 179 F-15Cs are being

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 2, 56th OG	Klamath Falls Airport-Kingsley Field, Oregon	F-15B/C/D	56th FW/OG	AETC	
17th WPS	Nellis AFB, Nevada	F-15E	57th Wing/USAFWS	ACC	WA
40th FLTS	Eglin AFB, Florida	F-15C/D/E	96th TW/OG	AFMC	ET
44th FS	Kadena AB, Okinawa	F-15C/D	18th Wing/OG	PACAF	ZZ
67th FS	Kadena AB, Okinawa	F-15C/D	18th Wing/OG	PACAF	ZZ
85th TES	Eglin AFB, Florida	F-15C/E	53rd Wing/53rd TEG	ACC	OT
333rd FS (FTU)	Seymour Johnson AFB, North Carolina	F-15E	4th FW/OG	ACC	SJ
334th FS (FTU)	Seymour Johnson AFB, North Carolina	F-15E	4th FW/OG	ACC	SJ
335th FS	Seymour Johnson AFB, North Carolina	F-15E	4th FW/OG	ACC	SJ
336th FS	Seymour Johnson AFB, North Carolina	F-15E	4th FW/OG	ACC	SJ
389th FS	Mountain Home AFB, Idaho	F-15E	366th FW/OG	ACC	MO
391st FS	Mountain Home AFB, Idaho	F-15E	366th FW/OG	ACC	MO
422nd TES	Nellis AFB, Nevada	F-15C/D/E	53rd Wing/53rd TEG	ACC	OT
428th FS (see Note 1)	Mountain Home AFB, Idaho	F-15SG	366th FW/OG	ACC	MO
433rd WPS (see Note 2)	Nellis AFB, Nevada	F-15C/D	57th Wing/USAFWS	ACC	WA



A 93rd FS F-16C deployed on operations at Bagram, Afghanistan. **USAF/SMSGT Gary Rihn**

## F-16C/D FIGHTING FALCON

The first F-16A was delivered to Luke AFB, Arizona, in August 1978. The first operational F-16A was delivered to Hill AFB, Utah, in January 1979. Production switched to the Block 25 F-16C in 1983. The first F-16C flew in June 1984. Block 30/32 and subsequent F-16C/Ds are powered by either the

General Electric F110 turbofan or the Pratt & Whitney F100 turbofan, although the two engines are not interchangeable. The Block 30/40 and 32/42 are respectively powered by the F110-GE-100 and the F100-PW-220. Block 40/42 aircraft were the first capable of carrying the LANTIRN AN/AAQ-13 navigation

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 1, 56th OG	Tucson International Airport, Arizona	F-16C/D	56th FW/OG	AETC	AZ
Det 93, 495th FG (see Note 1)	Homestead ARB, Florida	F-16C (Blk 30)	20th FW	ACC	FM
Det 100, 495th FG (see Note 1)	Dannelly Field, Alabama	F-16C (Blk 30)	20th FW	ACC	AL
Det 134, 495th FG (see Note 1)	Burlington International Airport, Vermont	F-16C (Blk 30)	20th FW	ACC	
Det 157, 495th FG (see Note 1)	McEntire JNGS, South Carolina	F-16C (Blk 52)	20th FW	ACC	
Det 176, 495th FG (see Note 1)	Dane County Regional Airport, Wisconsin	F-16C (Blk 30)	20th FW	ACC	WI
Det 457, 495th FG (see Note 1)	NAS JRB Fort Worth, Texas	F-16C (Blk 30)	20th FW	ACC	TX
AATC	Tucson International Airport, Arizona	F-16C/D (Blk 32)	57th Wing/USAFWS	ACC	AT
USAF ADS	Nellis AFB, Nevada	F-16C/D (Blk 52)	57th Wing	ACC	
USAF TPS	Edwards AFB, California	NF-16D	412th TW/OG	AFMC	
4th FS	Hill AFB, Utah	F-16C/D (Blk 40)	388th FW/OG	ACC	HL
13th FS	Misawa AB, Japan	F-16C/D (Blk 50)	35th FW/OG	PACAF	WW
14th FS	Misawa AB, Japan	F-16C/D (Blk 50)	35th FW/OG	PACAF	WW
16th WPS	Nellis AFB, Nevada	F-16C (Blk 42/52), F-16D (Blk 52)	57th Wing/USAFWS	ACC	WA
18th AGRS	Eielson AFB, Alaska	F-16C/D (Blk 30)	354th FW/OG	PACAF	AK
21st FS (see Note 2)	Luke AFB, Arizona	F-16A/B (Blk 20)	56th FW/OG	AETC	LF
35th FS	Kunsan AB, Republic of Korea	F-16C/D (Blk 40)	8th FW/OG	PACAF	WP
36th FS	Osan AB, Republic of Korea	F-16C/D (Blk 50)	51st FW/OG	PACAF	OS

40th FLTS	Eglin AFB, Florida	F-16C (Blk 25/40/42/50), F-16D (Blk 40/50)	96th TW/OG	AFMC	ET
55th FS	Shaw AFB, South Carolina	F-16C/D (Blk 50)	20th FW/OG	ACC	SW
64th AGRS	Nellis AFB, Nevada	F-16C/D (Blk 25/32/42)	57th Wing/57th ATG	ACC	WA
77th FS	Shaw AFB, South Carolina	F-16C/D (Blk 50)	20th FW/OG	ACC	SW
79th FS	Shaw AFB, South Carolina	F-16C/D (Blk 50)	20th FW/OG	ACC	SW
80th FS	Kunsan AB, Republic of Korea	F-16C/D (Blk 40)	8th FW/OG	PACAF	WP
82nd ATRS	Tyndall AFB, Florida	QF-16A/C	53rd Wing/53rd WEG	ACC	TD
85th TES	Eglin AFB, Florida	F-16C/D (Blk 40/50), QF-16C	53rd Wing/53rd TEG	ACC	OT
309th FS	Luke AFB, Arizona	F-16C/D (Blk 25)	56th FW/OG	AETC	LF
310th FS	Luke AFB, Arizona	F-16C/D (Blk 42)	56th FW/OG	AETC	LF
311th FS	Holloman AFB, New Mexico	F-16C/D (Blk 42)	56th FW/54th OG	AETC	LF
314th FS	Holloman AFB, New Mexico	F-16C/D (Blk 42)	56th FW/54th OG	AETC	LF
416th FLTS	Edwards AFB, California	F-16C/D (Blk 30/40/42/50)	412th TW/OG	AFMC	ED
421st FS	Hill AFB, Utah	F-16C/D (Blk 40)	388th FW/OG	ACC	HL
422nd TES	Nellis AFB, Nevada	F-16C/D (Blk 42/52)	53rd Wing/53rd TEG	ACC	OT
425th FS (see Note 3)	Luke AFB, Arizona	F-16C/D (Blk 42)	56th FW/OG	AETC	LF
480th FS	Spangdahlem AB, Germany	F-16C/D (Blk 50)	52nd FW/OG	USAFE	SP
510th FS	Aviano AB, Italy	F-16C/D (Blk 40)	31st FW/OG	USAFE	AV



An F-15C Eagle of the 123rd FS, Oregon ANG. **Jamie Hunter**



replaced by the Raytheon AN/APG-63(V)3 active electronically-scanned array (AESA) unit. The Eagle Passive/Active Warning Survivability System (EPAWSS) will boost electronic warfare capabilities. Under current plans the USAF will purchase 175 ADCP IIs for installation in the F-15C/D fleet, which includes 213 F-15Cs.

The multi-role F-15E Strike Eagle first flew in December 1986, and the first production model was

delivered to Luke AFB, Arizona, in April 1988. The USAF planned a fleet of 392 F-15Es; however, only 236 were delivered.

Like the air superiority variants, the Strike Eagle has undergone numerous upgrades, and 217 F-15Es will be equipped with Raytheon AN/APG-82(V)1 AESA radars in place of the original mechanically-steered systems. The Strike Eagle will also receive the EPAWSS.

492nd FS	RAF Lakenheath, Suffolk, UK	F-15E	48th FW/OG	USAFE	LN
493rd FS	RAF Lakenheath, Suffolk, UK	F-15C/D	48th FW/OG	USAFE	LN
494th FS	RAF Lakenheath, Suffolk, UK	F-15E	48th FW/OG	USAFE	LN
Air National Guard units					
114th FS	Klamath Falls Airport-Kingsley Field, Oregon	F-15B/C/D	173rd FW/OG	AETC	
122nd FS	NAS JRB New Orleans, Louisiana	F-15C/D	159th FW/OG	ACC	JZ
123rd FS	Portland International Airport/ANGB, Oregon	F-15C/D	142nd FW/OG	ACC	
131st FS	Westfield Barnes Airport/ANGB, Massachusetts	F-15C/D	104th FW/OG	ACC	MA
159th FS	Jacksonville International Airport, Florida	F-15C/D	125th FW/OG	ACC	
194th FS	Fresno-Yosemite International Airport/ANGB, California	F-15C/D	144th FW/OG	ACC	
Air Force Reserve Command units					
84 TES (see Note 3)	Eglin AFB, Florida	F-15C/E	926th Wing/OG	ACC	OT
307th FS (see Note 3)	Seymour Johnson AFB, North Carolina	F-15E	944th FW/414th FG	ACC	SJ
706th FS (see Note 3)	Nellis AFB, Nevada	F-15C/D/E	926th Wing/OG	ACC	WA
<b>1</b> 428th FS trains Republic of Singapore Air Force pilots. <b>2</b> Squadron utilizes aircraft assigned to host wing. <b>3</b> Classic associate squadron utilizes aircraft assigned to host wing.					

555th FS	Aviano AB, Italy	F-16C/D (Blk 40)	31st FW/OG	USAFE	AV
Air National Guard units					
100th FS	Montgomery Regional Airport-Dannelly Field, Alabama	F-16C/D (Blk 30)	187th FW/OG	ACC	AL
112th FS	Toledo Express Airport, Swanton, Ohio	F-16C/D (Blk 42)	180th FW/OG	ACC	OH
119th FS	Atlantic City International Airport/ANGB, New Jersey	F-16C (Blk 30)	177th FW/OG	ACC	NJ
120th FS	Buckley AFB, Aurora, Colorado	F-16C (Blk 30)	140th FW/OG	ACC	CO
121st FS	JB Andrews-NAF Washington, Maryland	F-16C/D (Blk 30)	113th Wing/OG	ACC	DC
125th FS	Tulsa International Airport, Oklahoma	F-16C/D (Blk 42)	138th FW/OG	ACC	OK
134th FS	Burlington International Airport, Vermont	F-16C (Blk 30)	158th FW/OG	ACC	
148th FS (FTU) (see Note 4)	Tucson International Airport, Arizona	F-16A/B (MLU)	162nd FW/OG	AETC	AZ
152nd FS (FTU)	Tucson International Airport, Arizona	F-16C/D (Blk 42)	162nd FW/OG	AETC	AZ
157th FS	McEntire JNGS, Eastover, South Carolina	F-16C/D (Blk 52)	169th FW/OG	ACC	
175th FS	Sioux Falls Regional Airport-Joe Foss Field, South Dakota	F-16C/D (Blk 40)	114th FW/OG	ACC	
176th FS	Dane County Regional Airport-Truax Field, Madison, Wisconsin	F-16C (Blk 30)	115th FW/OG	ACC	WI
179th FS	Duluth International Airport/ANGB, Minnesota	F-16C (Blk 50)	148th FW/OG	ACC	MN
182nd FS (FTU)	JB San Antonio-Kelly Field, Lackland AFB, Texas	F-16C/D (Blk 30)	149th FW/OG	AETC	SA
195th FS (FTU)	Tucson International Airport, Arizona	F-16C/D (Blk 25/32)	162nd FW/OG	AETC	AZ
Air Force Reserve Command units					
69th FS (see Note 5)	Luke AFB, Arizona	F-16C/D (Blk 25/42)	944th FW/OG	AETC	LF
84th TES (see Note 5)	Eglin AFB, Florida	F-16C/D (Blk 40/50)	926th Wing/OG	ACC	OT
93rd FS	Homestead ARB, Florida	F-16C/D (Blk 30)	482nd FW/OG		FM
457th FS	NAS JRB Fort Worth-Carswell Field, Texas	F-16C/D (Blk 30)	301st FW/OG	ACC	TX
466th FS (see Note 5)	Hill AFB, Utah	F-16C/D (Blk 40)	419th FW/OG		HL

706th FS (see Note 5)	Nellis AFB, Nevada	F-16C/D	926th Wing/OG		WA
<b>1</b> Active associate unit. <b>2</b> 21st FS trains Republic of China Air Force pilots. <b>3</b> 425th FS trains Republic of Singapore Air Force pilots. <b>4</b> 148th FS trains Royal Netherlands Air Force pilots using Dutch-owned aircraft. <b>5</b> AETC gained associate unit operates F-16C/D in support of 56th FW. <b>6</b> Classic associate squadron utilizes aircraft assigned to host wing.					



and AN/AAQ-14 targeting pods. Block 50/52 were respectively powered by the F110-GE-129 and F100-PW-229. Block 50D/52D aircraft were equipped with the AN/ASQ-213 HARM Targeting System (HTS) that provided employment capability for the AGM-88 missile.

The Common Configuration Implementation Program (CCIP) provided enhanced mission capabilities and common avionics for approximately 650 Block 40/42 and 50/52 fighters. In addition to AIM-9 and AIM-120 missiles, the fighters are compatible with a variety of precision laser and GPS-guided weapons such as Litening and Sniper targeting pods.

Today the F-16C comprises 50 per cent of the USAF fighter fleet. The inventory is primarily composed

of Block 30/32, 40/42 and 50/52 models, but a small number of older Block 25s remain. The USAF received 2,231 F-16s and more than 950 remain in service.

Modernization plans call for a service life extension program (SLEP). The USAF is considering options for integrating an AESA radar.

The F-16 is the full-scale aerial target (FSAT) successor to the QF-4. The QF-16C carried out its first manned test flight in May 2012. The first QF-16 was delivered to Tyndall AFB, Florida, for testing in November 2012, and 'production' QF-16C deliveries to the 82nd ATRS began on March 11, 2015. The FSAT is scheduled to achieve initial operational capability during the first quarter of Fiscal 2016.



F-22A RAPTOR

The first of nine engineering and manufacturing development (EMD) F-22As flew for the first time at Marietta, Georgia, in September 1997. Plans initially called for the acquisition of 648 Raptors. Production was eventually curtailed and 195 F-22As were delivered. The first operational F-22A was delivered to the 422nd Test and Evaluation Squadron at Nellis AFB, Nevada, in July 2003. Tyndall AFB, Florida's 325th FW, which served as the Raptor formal training unit,

received its first F-22A in September 2003. The initial assignment to a combat-coded squadron occurred when deliveries to the 1st Fighter Wing at Langley AFB began in May 2005. The Raptor achieved full operational capability with the 1st Fighter Wing in December 2007 and Lockheed Martin delivered the final F-22A to Joint Base Elmendorf-Richardson, Alaska, in May 2012. Whereas the baseline Increment 1 aircraft was designed as an air superiority fighter, Increment 2 added a Global Strike Basic



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
19th FS (ASSOC)	JB Pearl Harbor-Hickam, Hawaii	F-22A	15th Wing/OG	PACAF	HH
27th FS	JB Langley-Eustis, Virginia	F-22A	1st FW/OG	ACC	FF
31st TES (see Note 1)	Edwards AFB, California	F-22A	53rd Wing/53rd TEG	ACC	ED
43rd FS (FTU)	Tyndall AFB, Florida	F-22A	325th FW/OG	ACC	TY
90th FS	JB Elmendorf-Richardson, Alaska	F-22A	3rd Wing/OG	PACAF	AK
95th FS	Tyndall AFB, Florida	F-22A	325th FW/OG	ACC	TY
94th FS	JB Langley-Eustis, Virginia	F-22A	1st FW/OG	ACC	FF
411th FLT	Edwards AFB, California	F-22A	412th TW/OG	AFMC	ED
422nd TES	Nellis AFB, Nevada	F-22A	53rd Wing/53rd TEG	ACC	OT
433rd WPS (see Note 1)	Nellis AFB, Nevada	F-22A	57th Wing/USAFWS	ACC	WA
525th FS	JB Elmendorf-Richardson, Alaska	F-22A	3rd Wing/OG	PACAF	AK
Air National Guard units					
149th FS (see Note 1)	JB Langley-Eustis, Virginia	F-22A	192nd FW/OG	ACC	FF
199th FS	JB Pearl Harbor-Hickam, Hawaii	F-22A	154th Wing/OG	PACAF	HH
Air Force Reserve Command units					
301st FS (see Note 1)	Tyndall AFB, Florida	F-22A	301st FW/44th FG	ACC	TY
302nd FS (see Note 1)	JB Elmendorf-Richardson, Alaska	F-22A	477th FG	PACAF	AK
706th FS (see Note 1)	Nellis AFB, Nevada	F-22A	926th Wing/OG	ACC	WA
1 Squadron utilizes aircraft assigned to host wing. 2 Classic associate squadron utilizes aircraft assigned to host wing.					

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
16th WPS	Nellis AFB, Nevada	F-35A	57th Wing/USAFWS	ACC	WA
31st TES (see Note 1)	Edwards AFB, California	F-35A	53rd Wing/53rd TEG	ACC	OT
34th FS	Hill AFB, Utah	F-35A	388th FW/OG	ACC	HL
58th FS	Eglin AFB, Florida	F-35A	33rd FW/OG	AETC	EG
61st FS	Luke AFB, Arizona	F-35A	56th FW/OG	AETC	LF
62nd FS	Luke AFB, Arizona	F-35A	56th FW/OG	AETC	LF
422nd TES	Nellis AFB, Nevada	F-35A	53rd Wing/53rd TEG	ACC	OT
461st FLT	Edwards AFB, California	F-35A	412th TW/OG	AFMC	ED
1 Squadron utilizes aircraft assigned to host wing.					



F-35A LIGHTNING II

The USAF will be the second service to field the Joint Strike Fighter when the F-35A achieves initial operational capability between August and December 2016, once the first operational squadron at Hill AFB, Utah, is equipped with 12-24 aircraft, and personnel are capable of

conducting basic close air support (CAS), interdiction, and limited suppression and destruction of enemy air defenses (SEAD/DEAD) operations in a contested environment. Those aircraft will be equipped with Block 3I software. The subsequent Block 3F release is expected to provide the full combat capabilities including datalink imagery, full weapons, and embedded training. Training is carried out by the 33rd Fighter Wing at Eglin AFB, Florida, and the 56th Fighter Wing at Luke AFB, Arizona. Testing continues at Edwards AFB, California, and at Nellis AFB, Nevada, which also conducts tactics development. The first two operational F-35As were fielded to the 388th Fighter Wing at Hill AFB, Utah, on September 1, 2015. Ultimately, the USAF plans to purchase 1,763 F-35As by 2038.

Left: The first F-35A for the 34th FS at Hill AFB. USAF/Alex Lloyd



capability. It provided the capability of deploying AIM-9M and AIM-120C air-to-air missiles and two 1,000lb (454kg) GBU-31 Joint Direct Attack Munitions (JDAMs), upgraded the intra-flight datalink (IFDL) and enhanced connectivity with other Raptors.

Increment 3.1 provided the Northrop Grumman AN/APG-77 radar with advanced air-to-ground capabilities that include a synthetic aperture radar (SAR) ground-mapping mode. It also provides the capability to deliver up to eight GBU-39/B Small Diameter Bombs (SDBs). Increment 3.2 upgrades are being accomplished through a series of smaller packages and Increment 3.2A is a software upgrade that will provide additional enhanced electronic protection and improved communications, including a Link 16 datalink receive mode and enhanced combat identification and targeting capabilities. Fielding will be complete by October 2017. Increment 3.2B production is due to begin in 2016. Fielding of the

hardware and software update will commence in 2018, and 152 Raptors will receive the upgrades by August 2020. It provides improvements to the IFDL and enhanced stores management system (ESMS), upgrades emitter geo-location and electronic protection capabilities and AIM-9X and AIM-120D integration. Raptor pilots will receive a helmet-mounted cuing system by 2020.

Under the Common Configuration Program (CCP), the early Block 10 PRTV and Block 10 and 20 aircraft from low-rate initial production (LRIP) Lots 1, 2 and 3 were upgraded to a common Block 20 configuration that provided additional computer memory. A total of 39 Block 20 aircraft from Lots 3 and 4 will be upgraded to the Block 30/35 configuration.

The Raptor fleet will then include 139 combat-coded Block 30/35s, 32 training Block 20s, 12 development test/operational test (DT/OT) Block 20/30/35s, and two pre-block test aircraft.

## UH-1N, TH-1H IROQUOIS

The UH-1N entered USAF service in 1970 in the search and rescue role, but its missions expanded to include missile silo, distinguished visitor and survival school support. The inventory includes 62 UH-1Ns. Although the USAF has bolstered its UH-1N fleet with a number from the Marine Corps, it plans to acquire up to 72 vertical-

lift aircraft to replace them. In addition to the UH-1N, the USAF operates nearly 30 TH-1Hs in the training role.



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
1st HS	JB Andrews-NAF Washington, Maryland	UH-1N	11th Wing/811th OG	AFDW	
23rd FTS (see Note 1)	Lowe AHP, Fort Rucker, Alabama	UH/TH-1H	58th SOW/OG	AETC	FR
36th RQS	Fairchild AFB, Washington	UH-1N	58th SOW/OG	AETC	
37th HS	F. E. Warren AFB, Wyoming	UH-1N	582nd HG	AFGSC	FE
40th HS	Malmstrom AFB, Montana	UH-1N	582nd HG	AFGSC	MM
54th HS	Minot AFB, North Dakota	UH-1N	582nd HG	AFGSC	MT
459th AS	Yokota AB, Japan	UH-1N	374th AW/OG	PACAF	YJ
512th RQS	Kirtland AFB, New Mexico	UH-1N	58th SOW/OG	AETC	

1 Crews perform Rotary-Wing Qualification Course (RWQC) and Specialized Undergraduate Pilot Training — Helicopter (SUPT-H).

## HH-60G PAVE HAWK

The HH-60G is the Air Force's primary personnel recovery (PR) helicopter and is tasked with recovering isolated personnel from hostile or denied territory. The inventory includes 102 Pave Hawks. Developed from the UH-60A, the type entered service under the MH-60G designation from 1982.

The HH-60G is equipped with an external refueling boom and probe that allows the Pave Hawk to refuel from HC/KC/MC-130 tankers. It has a color weather radar, an electro-optical/infra-red (EO/IR) sensor, radar warning receiver, chaff/flame dispensers, infra-red jamming system, and hover infra-red suppression system (HIRSS).

Procurement of up to 24 UH-60Ms had been planned as part of the USAF's HH-60 Operational Loss Replacement (OLR). Ultimately, the service acquired four aircraft that were modified to rescue configuration by the Army Aviation and Missile Research Development and Engineering Center (AMRDEC). The first HH-60U was delivered in September 2011 and the four were assigned to an 'unspecified non-deploying test unit.'

In June 2014 the USAF awarded Sikorsky and Lockheed Martin a contract to build a new Black Hawk combat rescue helicopter. Based on the UH-60M, it is assigned the designation HH-60W. A total purchase of 112 helicopters is planned, and a first flight in 2019.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 3, AFTC	Nellis AFB, Nevada	HH-60U	AFMC/AFTC	AFMC	
33rd RQS	Kadena AB, Okinawa	HH-60G	18th Wing/OG	PACAF	ZZ
Det 1, 33rd RQS	Osan AB, Republic of Korea	HH-60G	18th Wing/OG	PACAF	ZZ
34th WPS	Nellis AFB, Nevada	HH-60G	57th Wing/USAFWS	ACC	WA
41st RQS	Moody AFB, Georgia	HH-60G	23rd Wing/347th RQG	ACC	FT
55th RQS	Davis-Monthan AFB, Arizona	HH-60G	23rd Wing/563rd RQG	ACC	FT
56th RQS	RAF Lakenheath, Suffolk, UK	HH-60G	48th FW/OG	USAFE	LN
66th RQS	Nellis AFB, Nevada	HH-60G	23rd Wing/563rd RQG	ACC	FT
88th TES (see Note 1)	Nellis AFB, Nevada	HH-60G	53rd Wing/TEG	ACC	OT
Det 1, 413th FLTS (see Note 2)	Nellis AFB, Nevada	HH-60G	96th TW/OG	AFMC	
512th RQS	Kirtland AFB, New Mexico	HH-60G	58th SOW/OG	AETC	
Air National Guard units					
101st RQS	Francis S. Gabreski Airport/ANGB, Westhampton Beach, New York	HH-60G	106th RQW/OG	ACC	
129th RQS	Moffett Federal Airport ANG, California	HH-60G	129th RQW/OG	ACC	CA
210th RQS	JB Elmendorf-Richardson, Alaska	HH-60G	176th Wing/OG	PACAF	
Det 1, 210th RQS	Eielson AFB, Alaska	HH-60G	176th Wing/OG	PACAF	
Air Force Reserve Command units					
301st RQS	Patrick AFB, Florida	HH-60G	920th RQW/OG	ACC	FL
305th RQS	Davis-Monthan AFB, Arizona	HH-60G	920th RQW/943rd RQG	ACC	DR

1 Squadron utilizes aircraft assigned to host wing. Combat Search and Rescue Combined Task Force (CSAR/CTF).  
2 Det 1, 413th FLTS is part of the Combat Search and Rescue Combined Test Force.



A 58th Rescue Squadron HH-60G Pave Hawk. USAF/SrA Jason Couillard



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
3rd SOS	Cannon AFB, New Mexico	MQ-1B	27th SOW/OG	AFSOC	
6th RS (FTU)	Holloman AFB, New Mexico	MQ-1B	49th Wing/OG	ACC	HO
11th RS (FTU)	Creech AFB, Nevada	MQ-1B	432nd Wing/OG	ACC	CH
15th RS	Creech AFB, Nevada	MQ-1B	432nd Wing/OG	ACC	CH
17th RS	Creech AFB, Nevada	MQ-1B	432nd Wing/732nd OG	ACC	CH
18th RS	Creech AFB, Nevada	MQ-1B	432nd Wing/OG	ACC	CH
20th RS	Whiteman AFB, Missouri	MQ-1B RSO	432nd Wing/OG	ACC	CH
22nd RS	Creech AFB, Nevada	MQ-1B	432nd Wing/732nd OG	ACC	CH
26th WPS (see Note 1)	Creech AFB, Nevada	MQ-1B	57th Wing/USAFWS	ACC	
Det 1, 31st TES	Grey Butte FTOF, Palmdale, California	MQ-1B	53rd Wing/TEG	ACC	CH
Det 1, 452nd FLTS	Grey Butte FTOF, Palmdale, California	MQ-1B	412th TW/OG	AFMC	
556th TES (see Note 1)	Creech AFB, Nevada	MQ-1B	53rd Wing/TEG	ACC	CH
558th FTS (see Note 2)	JB San Antonio-Randolph, Texas	MQ-1B	12th FTW/OG	AETC	RA
867th RS	Creech AFB, Nevada	MQ-1B	432nd Wing/732nd OG	ACC	CH
Air National Guard units					
111th RS	Ellington Field JRB, Houston, Texas	MQ-1B	147th RW/OG	ACC	EL
162nd RS	Springfield-Beckley Municipal Airport, Ohio	MQ-1B RSO	178th Wing/OG	ACC	
178th RS	Hector International Airport, Fargo, North Dakota	MQ-1B	119th Wing/OG	ACC	
196th RS	March ARB, California	MQ-1B	163rd RW/OG	ACC	
214th RS	Davis-Monthan AFB, Arizona	MQ-1B	162nd FW/214th RG	ACC	AZ
232nd OS (see Note 3)	Creech AFB, Nevada	MQ-1B	152nd AW/OG	ACC	CH
Air Force Reserve Command units					
78th ATKS (see Note 4)	Creech AFB, Nevada	MQ-1B	926th Wing/726th OG	ACC	CH
91st ATKS (see Note 4)	Creech AFB, Nevada	MQ-1B	926th Wing/726th OG	ACC	CH
429th ACTS (see Note 5)	Holloman AFB, New Mexico	MQ-1B	926th Wing/726th OG	ACC	HO

1 Squadron utilizes aircraft assigned to host wing.

2 558th FTS conducts undergraduate remotely-piloted aircraft training.

3 Classic associate squadron utilizes aircraft assigned to host wing.

4 78th RS and 91st RS are associate units and are integrated with the 432nd Wing.

5 429th ACTS operates MQ-1/MQ-9 assigned to the 49th Wing.

## MQ-1B PREDATOR, MQ-9 REAPER

The MQ-1B Predator is an armed, multi-mission, Tier II medium-altitude, long-endurance (MALE) remotely-piloted aircraft (RPA) that is deployed as a system consisting of four air vehicles, a ground control station (GCS) and satellite communication suite. The latter system allows the mission control element (MCE) to be thousands of miles away from the operating base where the launch and recovery element (LRE) is located.

The Predator flew for the first time in July 1994, and although still under development was deployed to Bosnia in July 1995 as an intelligence, surveillance and reconnaissance platform. First deployed in April 2011, the Block I RQ-1B featured numerous upgrades including a more powerful engine.

The addition of a strike capability resulted in the development of the MQ-1B, which was first fielded in 2002. Delivery of the final Predator occurred in March 2011.

The Predator is equipped with the AN/AAS-52 Multi-Spectral Targeting System (MTS-A), which integrates an infra-red sensor, color/monochrome daylight TV camera, image-intensified TV camera, laser designator and illuminator. Full-motion video from each of the imaging sensors can be viewed as separate video streams or fused together. Additionally, the aircraft can employ two laser-guided AGM-114 Hellfire air-to-ground missiles. Although more than 140 Predators are operated by 13 active-duty, six ANG and three AFRC units, the RPA will be phased out by 2018.

General Atomics began development of the Predator B unmanned air vehicle during 1999 and it made its first flight at the company's flight operations facility in El Mirage, California, in February 2001. Assigned the designation MQ-9A in February 2002 and re-named the Reaper, it is larger than the Predator A, and is powered by a single Honeywell TPE-331 turboprop engine that enables operation at higher altitudes than the Predator. These features allow it to operate at greater stand-off ranges and provide coverage for longer periods. Its larger payload permits the simultaneous carriage of multiple sensors including an improved camera system, the General Atomics Lynx synthetic aperture radar (SAR), a laser target designator, and weapons.

Viewed as a hunter-killer, the MQ-9A is equipped with the AN/AAS-52 MTS-B, which integrates an infra-red sensor, color/monochrome daylight TV camera, image-intensified TV camera, laser rangefinder/designator, laser illuminator and AN/APY-8 Lynx II radar that features synthetic aperture radar (SAR), and ground/dismount moving target indicator (GMTI/DMTI) modes. Four hardpoints under the wings mean the Reaper can carry multiple laser-guided AGM-114 Hellfire missiles and other munitions including the GBU-12 Paveway II laser-guided bomb and GBU-38 Joint Direct Attack Munitions.

The USAF recently began fielding the extended-range (ER) version





Squadron	Location	Aircraft	Wing/Group	Command	Tail code
3rd SOS	Cannon AFB, New Mexico	MQ-9A	27th SOW/OG	AFSOC	
9th ATKS (FTU)	Holloman AFB, New Mexico	MQ-9A	49th Wing/OG	ACC	HO
17th RS	Creech AFB, Nevada	MQ-9A	432nd Wing/732nd OG	ACC	CH
22nd RS	Creech AFB, Nevada	MQ-1B	432nd Wing/732nd OG	ACC	CH
29th ATKS (FTU)	Holloman AFB, New Mexico	MQ-9A	49th Wing/OG	ACC	HO
26th WPS (see Note 1)	Creech AFB, Nevada	MQ-9A	57th Wing/USAFWS	ACC	CH
30th RS	Tonopah Test Range, Nevada	MQ-9A	432nd Wing/732nd OG	ACC	
Det 1, 31st TES	Grey Butte FTOF, Palmdale, California	MQ-9A	53rd Wing/TEG	ACC	
33rd SOS	Cannon AFB, New Mexico	MQ-9A	27th SOW/OG	AFSOC	
42nd ATKS	Creech AFB, Nevada	MQ-9A	432nd Wing/OG	ACC	CH
432nd ATKS	Ellsworth AFB, South Dakota	MQ-9A RSO	432nd Wing/OG	ACC	
Det 1, 452nd FLTS	Grey Butte FTOF, Palmdale, California	MQ-9A	412th TW/OG	AFMC	
556th TES (see Note 1)	Creech AFB, Nevada	MQ-9A	53rd Wing/TEG	ACC	CH
Air National Guard units					
103rd ATKS	Horsham AGS, Pennsylvania	MQ-9A RSO	111th ATKW/OG	ACC	
105th ATKS	Nashville International Airport-JB Berry Field, Tennessee	MQ-9A RSO	118th Wing/OG	ACC	
108th ATKS (FTU)	Syracuse Hancock International Airport, New York	MQ-9A	174th ATKW/OG	ACC	
124th ATKS	Des Moines International Airport, Iowa	MQ-9A RSO	132nd Wing/OG	ACC	
136th AS	Niagara Falls International Airport/JARS, New York	MQ-9A RSO	107th AW/OG	ACC	
138th ATKS	Syracuse Hancock International Airport, New York	MQ-9A	174th ATKW/OG	ACC	
184th ATKS	Fort Smith Regional Airport/Ebbing ANGB, Arkansas	MQ-9A RSO	188th Wing/OG	ACC	
196th ATKS	March ARB, California	MQ-9A	163rd ATKW/OG	ACC	
232nd OS (see Note 2)	Creech AFB, Nevada	MQ-9A	152nd AW/OG	ACC	CH
172nd ATKS	W. K. Kellogg Regional Airport/ANGB, Battle Creek, Michigan	MQ-9A RSO	110th ATKW/OG	ACC	
Air Force Reserve Command units					
2nd SOS	Hurlburt Field, Florida	MQ-9A RSO	919th SOW/SOG	AFSOC	
78th ATKS (see Note 3)	Creech AFB, Nevada	MQ-9A	926th Wing/726th OG	ACC	CH
91st ATKS (see Note 3)	Creech AFB, Nevada	MQ-9A	926th Wing/726th OG	ACC	CH
429th ACTS (see Note 4)	Holloman AFB, New Mexico	MQ-9A	926th Wing/726th OG	ACC	HO

1 Squadron utilizes aircraft assigned to host wing.

2 Classic associate squadron utilizes aircraft assigned to host wing.

3 78th RS and 91st RS are associate units and are integrated with the 432nd Wing.

4 429th ACTS operates MQ-1/MQ-9 assigned to the 49th Wing.

of the Reaper, which is capable of carrying external fuel tanks and is equipped with heavyweight landing gear, a four-bladed propeller.

Operationally, the MQ-9A deployed to Afghanistan in September 2007, and completed its first combat strike in late October of that year, when an AGM-114 Hellfire missile was fired at enemy combatants near Deh Rawod. Nearly 250 Reapers are in service with 13 active-duty, 10 ANG and four AFRC squadrons.

**Left:** A 42nd ATKS MQ-9 Reaper from Creech AFB armed with GBU-12s. **USAF**

**Above right:** An RQ-4B assigned to the 9th RW. **USAF**

## RQ-4B GLOBAL HAWK

Originally known as Tier 2+, the RQ-4A Global Hawk was one of two high-altitude, long-endurance RPAs developed by the Defense Advanced Research Projects Agency (DARPA). Built by Teledyne Ryan Aeronautical in San Diego, California, now part of Northrop Grumman, the Global Hawk first flew in February 1998. Seven production Block 10 RQ-4As were fielded but were retired in 2011.

Flown in March 2007, the Block 20 RQ-4B featured numerous improvements and provided a 50 per cent payload increase. The RQ-4A and early RQ-4Bs shared the same basic integrated sensor suite (ISS) that included an electro-optical (EO), infra-red (IR), synthetic aperture radar (SAR) payload and limited signals intelligence (SIGINT). Six Block 20s were produced and

entered service from June 2008.

By 2012, four were converted to EQ-4B communications relay configuration, carrying the Battlefield Airborne Communication Node (BACN) payload.

The Block 30 RQ-4B carries electro-optical, infra-red, synthetic aperture radar (SAR), and high- and low-band SIGINT sensors. Block 30 initial operating capability (IOC) was declared in August 2011.

The first of 11 Block 40 RQ-4Bs was unveiled in June 2009 and completed its maiden flight that November. It carries the AN/ZPY-2 Multi-Platform Radar Technology Insertion Program (RTIP) active electronically-scanned array radar that provides MTI and SAR data. The Block 40 RQ-4B made its combat debut in September 2013. Some 33 RQ-4s are in service.



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 4, 9th OG	NAS Sigonella, Italy	RQ-4B	9th RW/OG	ACC	BB
Det 2, 53rd TEG (see Note 1)	Beale AFB, California	RQ-4B	53rd Wing	ACC	BB
Det 1, 69th RG	Andersen AFB, Guam	RQ-4B (Block 40)	9th RW/69th RG	ACC	GF
1st RS (FTU)	Beale AFB, California	RQ-4B (Block 30)	9th RW/OG	ACC	BB
12th RS	Beale AFB, California	RQ-4B (Block 30)	9th RW/OG	ACC	BB
348th RS	Grand Forks AFB, North Dakota	EQ-4B, RQ-4B (Block 40)	9th RW/69th RG	ACC	GF
31st TES (see Note 1)	Edwards AFB, California	RQ-4B	53rd Wing	ACC	ED
452nd FLTS	Edwards AFB, California	RQ-4B	412th TW/OG	AFMC	ED
Air Force Reserve Command units					
13th RS (see Note 2)	Beale AFB, California	RQ-4B	940th Wing/OG	ACC	BB

1 Squadron utilizes aircraft assigned to host wing.

2 13th RS is an associate unit and is integrated with the 9th RW.

## RQ-170A SENTINEL

Existence of the Lockheed Martin RQ-170 was first confirmed in December 2009 although it was first sighted around Kandahar Airfield, Afghanistan in 2007. Initially referred to as the 'Beast of Kandahar', the low-observable

unmanned aircraft system (UAS) was developed by Lockheed Martin's Skunk Works. It is operated by the 432nd Wing's 30th RS at Creech AFB and the Tonopah Test Range in Nevada. One crashed in north-eastern Iran in December 2011.



Squadron	Location	Aircraft	Wing/Group	Command	Tail code
8th FTS	Vance AFB, Oklahoma	T-6A	71st FTW/OG	AETC	VN
33rd FTS	Vance AFB, Oklahoma	T-6A	71st FTW/OG	AETC	VN
37th FTS	Columbus AFB, Mississippi	T-6A	14th FTW/OG	AETC	CB
41st FTS	Columbus AFB, Mississippi	T-6A	14th FTW/OG	AETC	CB
85th FTS	Laughlin AFB, Texas	T-6A	47th FTW/OG	AETC	XL
89th FTS	Sheppard AFB, Texas	T-6A	80th FTW/OG	AETC	EN
434th FTS	Laughlin AFB, Texas	T-6A	47th FTW/OG	AETC	XL
455th FTS	NAS Pensacola, Florida	T-6A	12th FTW/479th FTG	AETC	AP
459th FTS	Sheppard AFB, Texas	T-6A	80th FTW/OG	AETC	EN
559th FTS	JB San Antonio-Randolph, Texas	T-6A	12th FTW/OG	AETC	RA

## Air Force Reserve Command units

5th FTS (see Note 1)	Vance AFB, Oklahoma	T-6A	340th FTG	AETC	VN
39th FTS	JB San Antonio-Randolph, Texas	T-6A	340th FTG	AETC	RA
43rd FTS	Columbus AFB, Mississippi	T-6A	340th FTG	AETC	CB
96th FTS	Laughlin AFB, Texas	T-6A	340th FTG	AETC	XL
97th FTS	Sheppard AFB, Texas	T-6A	340th FTG	AETC	EN

1 AETC-gained associate unit, provides instructor pilots for T-6A and utilizes aircraft assigned to host wing.

## T-6A TEXAN II

The Beechcraft T-6A Texan II flew for the first time at Beech Field, Wichita, Kansas, in July 1998. Developed from the Pilatus PC-9, it won the Joint Primary Aircraft Training System (JPATS) competition in June 1995. Intended as a replacement for the Cessna T-37B, the Texan

II achieved initial operational capability (IOC) in July 2002 and the USAF accepted the last of 454 T-6As in May 2010. The aircraft is operational at six locations and flown by 10 active-duty flying training squadrons. Five AFRC associate squadrons conduct training with the aircraft at five primary training bases.

T-6A Texan IIs of the 559th FTS at JB San Antonio-Randolph. **USAF/Joel Martinez**



## NT-43A NAVIGATOR

Developed from the Boeing 737-200 airliner that first flew on April 9, 1967, the T-43A was primarily used in the USAF's undergraduate navigator and combat systems officers training programs. The last T-43A was retired from service at Randolph AFB, Texas, in September

2010. A single aircraft operated by AFMC under the designation NT-43A received major modifications that converted the aircraft as an airborne radar testbed and reportedly supports the development and testing of stealth aircraft and unmanned platforms.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
3rd FTS	Vance AFB, Oklahoma	T-1A	71st FTW/OG	AETC	VN
48th FTS	Columbus AFB, Mississippi	T-1A	14th FTW/OG	AETC	CB
86th FTS	Laughlin AFB, Texas	T-1A	47th FTW/OG	AETC	XL
99th FTS	JB San Antonio-Randolph, Texas	T-1A	12th FTW/OG	AETC	RA
451st FTS	NAS Pensacola, Florida	T-1A	12th FTW/479th FTG	AETC	AP

## Air Force Reserve Command units

5th FTS (see Note 1)	Vance AFB, Oklahoma	T-1A	340th FTG	AETC	VN
39th FTS	JB San Antonio-Randolph, Texas	T-1A	340th FTG	AETC	RA
43rd FTS	Columbus AFB, Mississippi	T-1A	340th FTG	AETC	CB
96th FTS	Laughlin AFB, Texas	T-1A	340th FTG	AETC	XL
97th FTS	Sheppard AFB, Texas	T-6A	340th FTG	AETC	EN

1 AETC-gained associate unit, provides instructor pilots for T-1A and utilizes aircraft assigned to host wing.

## T-1A JAYHAWK

Developed by Mitsubishi Heavy Industries, the MU-300 Diamond first flew in August 1978 and the design was sold to Beech Aircraft

in 1985. The Beechjet 400T was selected in February 1990 to serve as a trainer for student pilots



destined to fly airlift or tanker aircraft, as part of the Tanker/Transport Training System (TTTS). The first T-1A flew in 1991 and deliveries to Reese AFB, Texas began in January 1992. The Jayhawk supports the

advanced phase of specialized undergraduate pilot training (SUPT). It has cockpit seating for an instructor and two students, plus four passenger seats. The USAF acquired 180 T-1As and more than 170 remain in service.

T-1A Jayhawks of the 48th FTS. **USAF**





A T-38 Talon of the 509th Bomb Wing at Whiteman AFB. **USAF/SSgt Jonathan Snyder**

## T-38A/C, AT-38C TALON

Between 1961 and 1972, more than 1,100 T-38s were delivered to the USAF, and over 500 remain in service.

The majority of Talons support the advanced phase of the USAF's specialized undergraduate pilot training (SUPT). The aircraft are also used as a lead-in fighter trainer, under the introduction to fighter fundamentals (IFF) program. Although retired from the UPT role in May 2007, more than 50 T-38As and six T-38Bs continue to serve as companion trainers and as aggressor aircraft in support of the U-2S, B-2A and F-22A fleets.

AETC began receiving T-38Cs in 2001 as part of the avionics

upgrade program that provided the T-38A and AT-38B with a 'glass' cockpit. The ongoing Pacer Classic program provides the aircraft with a series of structural modifications intended to extend its service life. Pacer Classic III will ensure the structural airworthiness of 150 T-38s and maintain the T-38 fleet's viability until 2029. The training fleet currently includes more than 430 T-38Cs.

In March 2015 the USAF released requirements for the T-X aircraft that will replace the Talon. The service plans to award a contract for 350 T-X aircraft in 2017 and the new type will achieve initial operational capability by the end of 2023.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
1st RS (FTU)	Beale AFB, California	T-38A	9th RW/OG	ACC	BB
2nd FTRS	Tyndall AFB, Florida	T-38A/B	325th FW/OG	ACC	TY
25th FTS	Vance AFB, Oklahoma	T-38C	71st FTW/OG	AETC	VN
49th FTRS	Columbus AFB, Mississippi	AT-38C	14th FTW/OG	AETC	CB
50th FTS	Columbus AFB, Mississippi	T-38C	14th FTW/OG	AETC	CB
71st FTRS	JB Langley-Eustis, Virginia	T-38A/B	1st FW/OG	ACC	FF
87th FTS	Laughlin AFB, Texas	T-38C	47th FTW/OG	AETC	XL
88th FTRS	Sheppard AFB, Texas	AT-38C	80th FTW/OG	AETC	EN
90th FTS	Sheppard AFB, Texas	T-38C	80th FTW/OG	AETC	EN
99th RS	Beale AFB, California	T-38A	9th RW/OG	ACC	BB
394th CTS (FTU)	Whiteman AFB, Missouri	T-38A	509th BW/OG	AFGSC	WM
416th FLTS	Edwards AFB, California	T-38C	412th TW/OG	AFMC	ED
435th FTRS	JB San Antonio-Randolph, Texas	AT-38C	12th FTW/OG	AETC	RA
469th FTS	Sheppard AFB, Texas	T-38C	80th FTW/OG	AETC	EN
560th FTS	JB San Antonio-Randolph, Texas	T-38C	12th FTW/OG	AETC	RA
586th FLTS	Holloman AFB, New Mexico	T-38C	96th TW/TESTG	AFMC	HT
Air Force Reserve Command units					
5th FTS (see Note 1)	Vance AFB, Oklahoma	T-38C	340th FTG	AETC	VN
39th FTS	JB San Antonio-Randolph, Texas	T-38C, AT-38C	340th FTG	AETC	RA
43rd FTS	Columbus AFB, Mississippi	T-38C, AT-38C	340th FTG	AETC	CB
96th FTS	Laughlin AFB, Texas	T-38C	340th FTG	AETC	XL
97th FTS	Sheppard AFB, Texas	T-38C, AT-38C	340th FTG	AETC	EN
1 AETC-gained associate unit, provides instructor pilots for T/AT-38C and utilizes aircraft assigned to host wing.					

## U-2S

First flown as the U-2A in August 1955, the U-2S is significantly larger and more capable than the original high-altitude reconnaissance aircraft. The U-2S is the sole manned strategic reconnaissance asset still employed by the USAF.

Lockheed delivered 12 U-2Rs between 1967 and 1970, and from 1981 to 1993 it produced 18 similar TR-1As. Structurally identical to the U-2R, the TR-1A entered service

in 1983 and was re-designated as the U-2R in 1991. Upgraded with a General Electric F118-101 turbofan engine, the first U-2S was re-delivered in October 1994, and the final one in 1999. The two-seat trainer variant is designated TU-2S.

The U-2S carries multiple sensors including cameras, infra-red and radar systems as well as electronic intelligence packages. Although aircraft are deployed to Korea, Europe and South-west Asia, the entire fleet is controlled by the 9th

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
Det 1, 9th OG	RAF Akrotiri, Cyprus	U-2S	9th RW/OG	ACC	BB
Det 2, 53rd TEG (see Note 1)	Beale AFB, California	U-2S	53rd Wing/OG	ACC	BB
1st RS (FTU)	Beale AFB, California	U-2S, TU-2S	9th RW/OG	ACC	BB
5th RS	Osan AB, Republic of Korea	U-2S	9th RW/OG	ACC	BB
99th RS	Beale AFB, California	U-2S	9th RW/OG	ACC	BB

1 Squadron utilizes aircraft assigned to host wing.

Reconnaissance Wing at Beale AFB, California. Raytheon is developing an updated version of the U-2S's Advanced Synthetic Aperture Radar System (ASARS), one of the

sensors carried in the aircraft's interchangeable nose section.

The U-2S will now likely be retired in 2019 and replaced with an unmanned platform.



A U-2S of the 5th RS at Osan AB. **Jake Melampy**



## U-28A

Part of AFSOC's NSAv fleet, the U-28A is a modified Pilatus PC-12. An initial batch of six aircraft were purchased in 2005.

Sierra Nevada Corporation (SNC) carried out modifications prior to delivery adding electro-optical/infra-red (EO/IR) sensors, and advanced navigation systems equipment. The advanced communications suite includes datalinks that are capable of transmitting high-definition full-motion video (FMV), data, and voice communications.



An AFSOC U-28A flies near Hurlburt Field. **USAF**

By 2012 more than 30 U-28As had been acquired. Upgrades have reportedly incorporated high-definition (HD), full-motion video (FMV) and signals intelligence (SIGINT) capability. AFSOC plans to maintain 31 aircraft by Fiscal 2018.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
14th WPS (see Note 1)	Hurlburt Field, Florida	U-28A	57th Wing/USAFWS	ACC	
19th SOS (FTU) (see Note 1)	Hurlburt Field, Florida	U-28A	AFSOAWC	AFSOC	
34th SOS	Hurlburt Field, Florida	U-28A	1st SOW/SOG	AFSOC	
318th SOS	Cannon AFB, New Mexico	U-28A	27th SOW/SOG	AFSOC	
319th SOS	Hurlburt Field, Florida	U-28A	1st SOW/SOG	AFSOC	
551st SOS (FTU) (see Note 1)	Cannon AFB, New Mexico	U-28A	AFSOAWC	AFSOC	

1 Utilizes aircraft assigned to host wing.

## CV-22B OSPREY

The CV-22B is the special operation forces variant of the Osprey, tasked with long-range infiltration, exfiltration and re-supply missions.

The first of two test aircraft was delivered to Edwards AFB, California, in November 2000. Aircrew training began at Kirtland AFB, New Mexico, in August 2006. The first operational CV-22B was delivered to the 1st Special Operations Wing at Hurlburt

Field, Florida, in January 2007 and initial operating capability was achieved in March 2009. The aircraft began its debut operational deployment in March 2010, when six CV-22Bs arrived in Afghanistan.

Three operational squadrons and the formal training unit share 46 CV-22Bs. Funding for the final four was provided in Fiscal 2014 and delivery of the last CV-22B will occur in Fiscal 2017.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
7th SOS	RAF Mildenhall, Suffolk, England	CV-22B	352nd SOW/752nd SOG	AFSOC	
8th SOS	Hurlburt Field, Florida	CV-22B	27th SOW/SOG	AFSOC	
14th WPS (see Note 1)	Hurlburt Field, Florida	CV-22B	57th Wing/USAFWS	ACC	
20th SOS	Cannon AFB, New Mexico	CV-22B	27th SOW/SOG	AFSOC	
71st SOS	Kirtland AFB, New Mexico	CV-22B	58th SOW/OG	AETC	

1 Utilizes aircraft assigned to host wing.

### USAF/SrA Julianne Showalter



## MISCELLANEOUS TYPES

### UV-18A/B Twin Otter

DHC-6s entered the USAF inventory in 1977, when two UV-18Bs were delivered to the US Air Force Academy. Based on the DHC-6-300, the UV-18Bs are used for parachute training.

### USAF Gliders

The US Air Force Academy operates several types of sailplanes. The fleet consists of two Schempp-Hirth TG-15As, three Schempp-Hirth TG-15Bs and 18 TG-16A trainer and advanced soaring sailplanes.

### TG-15A Discus, TG-15B Duo Discus

The TG-15A is based the Schempp-Hirth Discus 2b single-seat glider. Two examples were purchased in 2004 for use in competitions.

### TG-16A

The US Air Force Academy accepted the first of 19 new two-seat DG-1001S Club gliders from DG Flugzeugbau GmbH in July 2011.

### T-51A

Three Cessna 150s are used by cadets from the USAF Academy Flying Team as their primary competition aircraft in National Intercollegiate Flying Association events as T-51As.

### T-41D Mescalero

Used by the US Air Force Academy for flying team support, tactical navigation (TACAV), and orientation flights, the T-41D is a military version of the Cessna 172. Four aircraft are currently in service.

### T-53A

The USAF ordered 25 SR20s from Cirrus Aircraft in March 2011 for the Air Force Academy's airmanship training program. Delivery of the initial pair of T-53As to the 557th Flying Training Squadron occurred in June 2011.

### DA20-C1

Doss Aviation operates a fleet of Diamond Aircraft DA20-C1s from its facility at Pueblo Memorial Airport, Colorado, in support of the USAF's initial flight training (IFT) program.

### A-29B Super Tucano

Sierra Nevada Corporation and Embraer delivered 20 EMB-314 Super Tucano light air support (LAS) aircraft to the USAF. These A-29Bs will go to the Afghan Air Force. Delivery of the first A-29A to Moody AFB, Georgia, occurred in September 2014 and the training of Afghan pilots began in January 2015. Delivery to Afghanistan is scheduled for December 2015.

Squadron	Location	Aircraft	Wing/Group	Command	Tail code
1st FTS (see Note 1)	Pueblo Memorial Airport, Colorado	DA20-C1	12th FTW/306th FTG	AETC	AF
94th FTS	USAF Airfield, Colorado Springs	TG-15A/B, TG-16A/B	12th FTW/306th FTG	AETC	AF
98th FTS	Peterson AFB, Colorado	UV-18A/B	12th FTW/306th FTG	AETC	AF
557th FTS	USAF Airfield, Colorado Springs	T-41D, T-51A, T-53A	12th FTW/306th FTG	AETC	AF
81st FTRS (see Note 2)	Moody AFB, Georgia	A-29A	14th FTW/OG	AETC	
USAF TPS	Edwards AFB, California	TG-10A/D, TG-14A	412th TW/OG	AFMC	ED
427th SOS	Pope AAF, Fort Bragg, North Carolina	CN235, Cessna 208		AFSOC	
30th RS	Tonopah Test Range, Nevada	RQ-170A	432nd Wing/732nd OG	ACC	
Det 1, 375th OG (see Note 3)	Will Rogers World Airport, Oklahoma City, Oklahoma	Challenger CL601/604	375th AMW/OG	AMC	
Air Force Reserve Command units					
70th FTS (see Note 5)	USAF Airfield, Colorado Springs	TG-15A/B, TG-16A, UV-18A/B, T-41D, T-51A, T-53A	340th FTG	AETC	AF
1st ASF (see Note 10)	Will Rogers World Airport, Oklahoma City, Oklahoma	Challenger CL601/604	507th ARW/OG	AMC	

1 1st FTS is responsible for IFS, which is conducted by Doss Aviation.

2 Squadron trains Afghan Air Force personnel using Super Tucano.

3 Unit conducts Combat Flight Inspection (CFIN) mission and utilizes Challenger aircraft owned by the Federal Aviation Administration (FAA).

4 Associate unit supports 306th FTG operations at the USAFA.

5 Associate unit supports Det 1, 375th OG mission. Conducts combat flight inspection (CFIN) mission and utilizes Challenger aircraft owned by the Federal Aviation Administration (FAA).



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