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Russian Airpower Almanac




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Journal of the Air Force Association

AIR FORCE MAGAZINE

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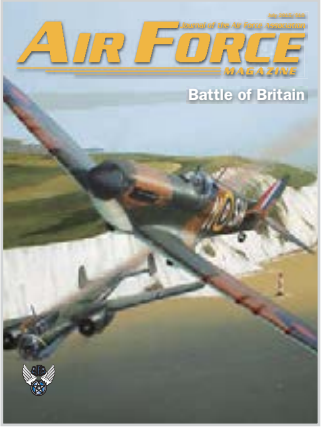
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Editor's note: This issue of *Air Force Magazine* features four different covers, randomly assigned and distributed. Readers interested in purchasing additional copies of the magazine, or a complete set, should contact our Membership Department at 1-800-727-3337, or by emailing membership@afa.org. **About the covers:** A Russian Sukhoi T-50. See "Russian Airpower Almanac," p. 48. Photo by Piotr Butowski / USAF and JASDF aircraft off the coast of Guam. See "Don't Call it a Comeback," p. 20. Photo by TSgt. Jason Robertson / SrA. Dustin Temple, SrA. Goodie Goodman, and TSgt. Matthew Greiner. See "Under Control," p. 26. USAF photos / A Spitfire takes down a Luftwaffe bomber. See "Their Finest Hour," p. 30. From an original painting by Ivan Berryman, courtesy of Cranston Fine Arts.

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Publisher: Mark A. Barrett
Editor in Chief: Adam J. Hebert

Managing Editor: Juliette Kelley Chagnon
Special Content Director: Michael C. Sirak
Editorial Director: John A. Tirpak
News Editor: Amy McCullough
Senior Editor: Marc V. Schanz
Senior Designer: Heather Lewis
Special Projects Manager: Gideon Grudo
Designer: Kristina Parrill
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Production Manager: Eric Chang Lee
Photo Editor: Zaur Eylanbekov
Media Research Editor: Chequita Wood

Contributors: Walter J. Boyne, Tobias Burns, Piotr Butowski, John T. Correll, Robert S. Dudney, Matt Schehl

Advertising: Scott Hill, James G. Elliott Co., Inc
(312) 348-1206
airforcemagsales@afa.org
1501 Lee Highway
Arlington, VA 22209-1198
Tel: (703) 247-5800
Telefax (703) 247-5855

afmag@afa.org

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Editorial

By Adam J. Hebert, Editor in Chief

Third Verse, Same as the First

The President has now clearly indicated, on three separate occasions, that he does not take ISIS seriously. The first indication of this was on Jan. 7, 2014, four days after ISIS terrorists captured Fallujah and raised ISIS flags over Iraqi government buildings. "If a JV team puts on Lakers uniforms, that doesn't make them Kobe Bryant," he said.

"But that JV team just took over Fallujah," the *New Yorker's* David Remnick reminded the President.

"I understand," Obama replied, but "how we think about terrorism has to be defined and specific enough that it doesn't lead us to think that any horrible actions that take place around the world that are motivated in part by an extremist Islamic ideology [are] a direct threat to us or something that we have to wade into."

The choice was clear from the start—the US could go to war to defeat ISIS or choose to ignore it. Instead of making a decision, the US has now stumbled along for a year-and-a-half.

The second clear signal of Obama's ambivalence came last June, after ISIS forces routed government forces and overran Mosul, Iraq's second-largest city. The President authorized limited air strikes and stepped up USAF's efforts to avert looming humanitarian disasters.

Nearly three weeks after the air campaign began, Obama admitted, "We don't have a strategy yet." The Administration did not come forward with its "strategy to degrade and ultimately destroy" ISIS for weeks.

The US clearly ramped up the scope of the effort at that point, by sending additional train-and-assist troops to Iraq and expanding air strikes into Syria. Overall, however, America's combat effort remained a low-level air campaign.

Obama has now indicated for a third time that he just doesn't take the war against ISIS, or ISIL, seriously. The President said June 8 that coalition forces "have made significant progress in pushing back ISIL … [but] they're displaced in one place then they come back in, in another. And they're nimble, and they're aggressive, and they're opportunistic."

Little is being done about this. Why isn't the US response also nimble, aggressive, and opportunistic? These are the very benefits a serious airpower campaign would bring. Instead, the President expressed continuing desire for the US to work at low levels, behind the scenes, supporting local forces.

The US is "reviewing a range of plans [for] accelerating the number of Iraqi forces that are properly trained and equipped and have a focused strategy and good leadership," Obama said.

If the Obama Administration isn't committed to victory, the US shouldn't be fighting.

"When a finalized plan is presented to me by the Pentagon, then I will share it with the American people. We don't yet have a complete strategy because it requires commitments on the part of the Iraqis."

In other words, US strategy is at the mercy of Iraqi forces the US has already spent the better part of a decade attempting to develop, train, and professionalize. The same Iraqi forces Defense Secretary Ashton B. Carter recently said "just showed no will to fight."

The Administration doubled down on the support role. "In furtherance of his comprehensive strategy to degrade and destroy the ISIL terrorist group, President Obama has approved additional actions," read a June 10 White House announcement centered on sending another 450 troops to train indigenous forces. "These additional US troops will not serve in a combat role," the White House made clear.

"Despite years of training by thousands of US and coalition forces, the army has not been able to halt Islamic State aggression," noted retired Lt. Gen. David A. Deptula, dean of AFA's Mitchell Institute, in a June 5 *Washington Post* op-ed. "What makes anyone think that a few more months of similar training will yield success?"

The Administration appears unwilling to make the tough choices required here. There are good reasons to avoid putting US forces in Iraq or Syria. If ground troops are deployed, whether as combat forces, for intelligence, or as combat controllers to call in air strikes, the US will have to supply them and protect them. We can expect that any American troops captured by ISIS will be tortured and executed with video cameras rolling. Ultimately, Iraq and Syria must be responsible for their own security.

As Commander in Chief, it is Obama's prerogative to walk away from this fight, but he has instead chosen a halfhearted approach. If this is a battle worth fighting, it should be fought to win.

Top Air Force officials say airpower, even in a limited form, has been working in this battle. Gen. Herbert J. "Hawk" Carlisle, head of Air Combat Command, says the Air Force prevents ISIS forces from massing and has cut off their ability to sell stolen oil.

These are especially important considerations because ISIS does not aspire to be a terror organization—it wishes to be an actual nation, which means it must come out of hiding and govern. When the Air Force is overhead, ISIS cannot do so without fear of destruction.

The rules of engagement need to be loosened, because three-quarters of today's strike sorties do not deliver weapons. As Deptula asked, "What is the logic of a policy that restricts the use of airpower to avoid the possibility of collateral damage while allowing the certainty of the Islamic State's crimes against humanity?"

If the US is going to defeat ISIS, many more air strikes are necessary, supported by Americans on the ground. "It has never been more difficult to identify friend or foe," said Lt. Gen. John W. Hesterman III, commander of US Air Forces Central Command, June 8, explaining the care the US takes to avoid civilian casualties. "What we need is precise information about where the enemy is." Sending in special operations forces and joint terminal attack controllers would help.

At the current level of air effort, all the coalition has been able to do is fight ISIS to a draw. A stalemate accomplishes nothing but putting aircrews in danger every time they fly over ISIS-held territory. ✪

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Aviano Danger Close

After reading "Watershed Air War," April, p. 58, I wanted to share that there were fatalities omitted from the article. In the June issue, I read where Lieutenant General Short did note that two pilots lost their lives in an Apache helicopter mishap *["Letters: Setting it Straight," June, p. 6].*

There are two other things worthy of note: The Apache crew was NOT in the war zone, and if I recall, they (A1C John M. Johnson and A1C Jovan D. Griffin) were exercising to prepare to deploy, not in a deploy mode to Kosovo.

Also, there were two other fatalities. Two airmen deployed to Aviano lost their lives in a vehicle mishap (crash) on the autostrada.

I was stationed at Aviano, which was considered a hazardous duty location during OAF. I received hazard pay but went home to my family each night. It was odd.

SMSgt. Mark Cipriano,
USAF (Ret.)
Elyria, Ohio

Almanac Umbrage Taken

In the June issue of *Air Force Magazine ["Letters: I Just Can't Even. Floppy Disks?" p. 6],* there are two letters bemoaning the use of ancient 5.25-inch floppies shown in your April 2015 issue. Sorry, it's even worse than that. Those are eight-inch floppies, which preceded 5.25-inch floppies *["Nuclear Force Improvements," p. 40].* I even saw a discussion of these dinosaurs on what I seem to recall was a CBS "60 Minutes" segment on missile silos and how out-of-date they are. Unfortunately, those ancient floppies are only a small example of how outdated things are in the strategic missile organization's silos.

Next, I take umbrage at your failing to mention USAFSS (USAF Security Service) in the May 2015 issue. You failed to mention the existence of USAFSS, which was subsequently "redesignated" ELSEC (Electronic Security Command), which eventually became AIA (Air Intelligence Agency), which disappeared completely into the bowels of Air Force Air Combat Command. Sorry, but I can see no reason to have ever changed the name from USAFSS. What earthly purpose is served by renaming such a fine organization, which was of such great value during the Cold War? "Security Service" says everything and means nothing, as should a name of such an intelligence organization. Its name today is as meaningful now as it was then. Now intelligence organizations seem to be relegated to an administrative black hole of nameless organizations.

Thomas B. Roach
Lincoln, Calif.

■ *USAF Security Service was listed on p. 109 of the May issue as part of the lineage for Electronic Security Command/ Air Force Intelligence Command.*—THE EDITORS

[On] p. 57 under AFMC, AFTC, 96th Test Wing, you show F-35A/B/C. 96th is at Eglin and there are F-35s at Eglin, but they *all* belong to AETC 33rd Fighter Wing. Test Wing has none that I know of.

Col. Al Haberbusch,
USAF (Ret.)
Niceville, Fla.

It looks like your HH-60G inventory in the almanac is off by one *["Gallery of USAF Weapons." p. 80].* Number should be 97. It also appears that you reflect a HH-60U as a L based platform. It is 60M based.

Patrick Dugan
Springfield, Va.

After reading the 2015 annual USAF Almanac, I thought that the addition of the current pay scales for all ranks would be an excellent addition.

At my USAF reunions, many ask, "How much would we be paid today?"

Lt. Col. Richard L. Pinkerton,
USAF (Ret.)
Strongsville, Ohio

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Educate the public on the critical need for unmatched aerospace power and a technically superior workforce to ensure US national security.

Advocate for aerospace power and STEM education.

Support the Total Air Force family and promote aerospace education.

■ *We stopped publishing the DOD pay scales in May 2010 because the information is accessible online. You can find pay scale information at: http://militarypay.defense.gov/mpcalcs/Calculators/RMC.aspx.*—THE EDITORS

Pretty Famous, I'd Say

First, I'd like to say thanks for a great magazine. I've been a loyal subscriber for 20-plus years. I'm retired Air Force of 24-plus years, having spent 10 of those on the KC-10 Extender at three different bases.

I wanted to point out what I'm sure was an oversight but should be mentioned in May's issue *["Airpower Classics: KC-10 Extender," p. 144].*

Of the "Famous Fliers," I was shocked to see Col. Pamela Melroy, USAF and NASA retired, not mentioned. Colonel Melroy was one of the first female pilots accepted, assigned to the KC-10 with the 32nd Air Refueling Squadron, alongside General Paul Selva (mentioned) at Barksdale AFB, La., deploying on the KC-10 to Desert Storm. I know because I was with her as her crew chief.

After a very impressive Air Force career, including test pilot school at Edwards Air Force Base, she was selected by NASA as a space shuttle pilot, eventually becoming a shuttle commander, and flew at least three shuttle flights and spent several combined weeks aboard the International Space Station.

Again, thanks so much for a great magazine. I look forward to it every month and will be a subscriber for life.

MSgt. Roger G. Kennedy,
USAF (Ret.)
Red Bud, Ill.

Open It Up

I appreciated your brief yet concise description of "The RPA Problem" in *Air Force Magazine ["Editorial," May, p. 4].* While it evokes empathy for those who are obviously "overworked and underpaid," I find it nearly impossible to weep for the Air Force commanders from General Welsh on down. I could not agree more with the assessment of Secretary Gates, who has at times veiled his opinions but at others revealed them quite blatantly. He has complained that the while USAF is technologically the most advanced state-of-the-art military power on the planet, its command structure and organization is inexplicably stuck in the 1800s.

The concern for a lack of or loss of pilots is almost comical, not to mention a self-inflicted wound. Today's enlisted airmen are very often brighter and in many cases more technologically savvy than the smartest officer you can dig up. Has the Air Force readjusted itself to that fact? NO!

There are plenty of qualified enlisted airmen capable of flying a drone. These "youngsters" are after all the video-game monarchs back at the dormitory. If they are held liable to repair the multimillion dollar aircraft and keep it airborne, then they are certainly responsible enough to fly it. Just give them the training. Hap Arnold and Curtis LeMay would have drooled over these guys 50 years ago. Certainly more money might resolve the training and equipment issues incurred by increased demand. But as for the morale problems due to lack of personnel,I don't think America will shed any tears.

It's time the Air Force re-evaluated its command structure. I encourage the Air Force Association to lobby for returning the warrant officer or creating a limited-duty-officer position. But I'll take an E-5 aircraft mechanic with video gaming expertise off the flight line and match him against an ROTC, 22-year-old cadet who just finished drinking his way through college—any day of the week. You don't need to know Bernoulli's principle of fluid dynamics to fly a drone. Today's enlisted Air Force is exceptionally educated, and yet they continue to be treated like the unschooled folks they might have been 50 years ago.

In closing, let me ask: Who was that guy that earned his pilot wings under the flying sergeant program in 1943, never went to college, and yet mysteriously became one of the most celebrated fighter pilots in United States Air Force history? Oh, that's right, Brig. Gen. Chuck Yeager!

Hmmm. Makes you wonder.

Paul Stonehouse
Ashburn, Va.

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Action in Congress

By Megan Scully

Avoiding a Launcher Monopoly

The Air Force's long-awaited certification of upstart SpaceX to compete for lucrative satellite launch business came in late May, just as the Senate Armed Services Committee was sharpening its oversight of the Evolved Expendable Launch Vehicle program. The coincidental timing could ultimately prove beneficial for the service as it seeks a contract for GPS III launch services.

Arizona Republican Sen. John McCain, the new SASC chairman, has long been suspicious of sole-source contracts, putting United Launch Alliance's lock on the EELV program directly in his sights.

In the last year, Russia's illegal incursion in Ukraine has only heightened McCain's concerns about ULA, a Lockheed Martin Corp. and Boeing Co. joint venture that relies on a Russian-built motor for its Atlas V rocket.

In a statement following the Air Force's announcement, McCain called SpaceX's certification a "win for competition," and he wasted no time pointing out that unlike the RD-180, which powers the Atlas V, SpaceX's Falcon 9 rocket does not rely on a Russian engine, nor does ULA's larger, but more expensive, Delta IV rocket.

"Over the last 15 years, as sole-source contracts were awarded, the cost of EELV was quickly becoming unjustifiably high," McCain said. "I am hopeful that this and other new competition will help to bring down launch costs and end our reliance on Russian rocket engines that subsidizes Vladimir Putin and his cronies."

Indeed, McCain has made the issue an emotional one, arguing that fueling Russia's space and defense business is only helping to arm Russia's military against Ukrainian forces, a direct contradiction of US foreign policy.

"To acquire systems that put money in the pockets of cronies of Vladimir Putin, who is dismembering a country as we speak, would be an insult to the American taxpayer and a betrayal of everything the United States of America stands for and believes in," he told reporters May 14.

McCain's version of the Fiscal 2016 defense authorization bill, approved by his panel in May, addresses both the issue of competition and the Russian engine. Despite pushback from the Air Force, the bill revalidates the direction in last year's authorization measure to end the use of Russian engines for national security space launches by 2019.

Air Force Secretary Deborah Lee James has argued that the 2019 timetable is unrealistic, telling Senate appropriators in February that technical experts believe it will take six to eight years to develop and build the new rocket engine and another one to two years to integrate it on the rocket.



SpaceX's Falcon 9 doesn't need a Russian engine.

"This truly is rocket science," James said. "These are hard technological problems."

After the hearing, James directly addressed the issue of competition, telling reporters the 2019 date could ultimately tip the competition in SpaceX's favor, giving it the same type of advantage ULA has long enjoyed.

"I worry that we run the risk of trading one monopoly, which is what ULA has been, for a new monopoly," James said. "And I don't think anybody wants that to happen."

While McCain's bill maintains the 2019 date and requires a plan for achieving that goal, it does include an exception. This "special rule," allows the Air Force to award a competitive contract for as many as nine launches for the Atlas V, even if ULA cannot get a national security waiver for the engines.

"This could result in as few as zero Russian rocket engines or up to nine, depending upon the outcome of the competitions," according to the committee's report language, accompanying the bill. "The committee believes that the continued use of Russian rocket engines represents a threat to our national security and that their use should be minimized to the greatest extent practicable."

Since 2005, the Air Force "has spent billions of dollars supplementing the infrastructure and capacity of the incumbent launch provider. Also, since 2005, new launch providers have entered the market and created competition," according to the committee's report. "The committee believes that with the introduction of space launch competition, launch capability subsidies inappropriately inhibit fair competition and are no longer necessary."

The bill therefore includes language prohibiting contracts or line items to procure property or services for EELV space launches apart from the primary contract. This language effectively ends what the committee considers unfair subsidies to ULA for its Atlas V engine.

For their part, Air Force officials seem to agree and are working with the acquisition community to rework the so-called EELV launch capabilities contract that has served as an insurance policy of sorts to keep ULA on the program.

"I don't think you can have fair competition with that contract in place. There'll have to be a change," Gen. John E. Hyten, commander of Air Force Space Command, told House lawmakers in March.

Megan Scully is a reporter for CQ Roll Call.

Verbatim

verbatim@afa.org

By Robert S. Dudney

Calamitous

"They had access on everyone who has applied for a security clearance: families, residences and job assignments, bank records." ... If that's not an absolute calamity, I don't know what is."***—"Victor Socotra," pen name for a retired US intelligence official and blogger, commenting on China's cyber theft of data on US service members,*** **Military Times,** ***June 17.***

Hypersonic World

"X-51 [hypersonic vehicle] was really a proof-of-concept test. It showed that you could get a scram jet engine, launch it off an aircraft, and it could go hypersonic. It was able to go more than Mach 5 until it ran out of fuel. It was a very successful test of an airborne hypersonic weapons system. What they are trying to do now is build the whole system so that it is not just about the engine. You have to have materials that can operate at the kind of temperatures you have when you are going at hypersonic speeds. You have to have guidance systems that will function when you are going at those types of speeds. There are a bunch of technological challenges that have to be addressed to make a functioning system that will work. ... The advantage of hypersonics is not just that something goes very fast—but that it can go great distances at those speeds."***—Air Force Chief Scientist Mica R. Endsley, commenting on the Air Force hypersonic effort, quoted in*** **Military.com,** ***June 1.***

Ray the Knife

"If you want to look at real money, 20 percent of the Pentagon budget—20 percent, one dollar out of every five—is spent on the 'fourth estate'—the Office of the Secretary of Defense, the defense agencies, the organizations run by the undersecretaries. Pure overhead. Pure overhead. And they've grown far faster than the services."***—Secretary of the Navy Ray Mabus, remarks to the American Enterprise Institute, June 2.***

Right, Nothing to It

"There isn't so much to tell. ... I began to get ready. They'd a box of hand grenades there, and I took them out of the box and laid them all in a row where they would be handy. ... The snippin' and clippin' of the wires sounded near, so I let go with a hand grenade. There was a yell from a lot of surprised Dutchmen [Deutschmen, i.e., German troops] and then they started firing. ... Some of the shots got me. One clipped my head, another my lip, another my hand, some in my side, and one smashed my left foot so bad that I have a silver plate holding it up now. The Germans came from all sides. ... When the grenades were all gone I started in with my rifle. ... There was nothing to do but use my rifle as a club and jump into them. I banged them on the dome and the side and everywhere I could land until the butt of my rifle busted. One of the Germans hollered, 'Rush him! Rush him!' I decided to do some rushing myself. I grabbed my French bolo knife and slashed in a million directions. ... They knocked me around [considerably] and whanged me on the head, but I always managed to get back on my feet. ... I was still banging them when my crowd came up and saved me and beat the Germans off. That's about all. There wasn't so much to it."***—US Army Pvt. Henry L. Johnson, contemporary account of May 14, 1918, battle in France. Johnson, who served in an all-black unit, was posthumously awarded the Medal of Honor, on June 2, for his actions that day, thedailybeast.com.***

Uniform, Rank, Salute

"Lateral entry [into military services] would make a lot of sense. I think nowadays the essential skills of being a military leader are not to shoot a weapon, they are not even to read a map. They're to make tough decisions in an uncertain environment and to engage with people and build relations. ... Lateral entry, even at a fairly senior level, ... would make them stronger. There's a natural aversion to it, because people in the guild don't want outsiders coming in and taking slots, but I think it would be very, very healthy, for the military and others. ... Someone could say, 'We want you to come into the Army for four years. Here's what you'd do and we're going to make you rank X.' In three months, they could get you the right uniforms, teach you how to salute. You'd walk in and be effective right away. ... I've dealt with a lot of chief executive officers who could walk in and be general officers in the military tomorrow. All we'd have to do is get them a uniform and a rank."***—Retired Army Gen. Stanley A. McChrystal,*** **Washington Post,** ***May 15.***

Dempsey Dumps on ISF

"The ISF [Iraqi Security Forces] was not driven out of Ramadi. They drove out of Ramadi."***—Gen. Martin E. Dempsey, Chairman of the Joint Chiefs of Staff, on the fall of Ramadi to ISIS, remarks to reporters, May 22.***

Why Omar Still Breathes

"The first I knew the Predator was [engaged] was when I heard an unknown voice on my radio say, 'You are cleared to fire.' Instead of striking Omar's facility, the Predator targeted and destroyed a vehicle outside, killing several bodyguards. In the chaotic moments that followed, the Taliban leader escaped. ... Mullah Omar and his senior staff piled out of that building, and here we are, 13 years later, and we don't know where he is. What was the rationale of shooting an empty truck when the leadership was in an adjacent building, and where we had, two minutes away, aircraft that could have sent Mullah Omar and the senior Taliban leadership to the nether regions? .... To this day, there is a degree of uncertainty over just who issued that fire order. We [he and then-USAF Gen. Charles F. Wald] both watched the weapon impact, and both turned to each other simultaneously and said, 'Who the f--- did that?'"***—Retired USAF Lt. Gen. David A. Deptula, describing a CIA drone attack on the first night of the Afghan War. He is quoted by Chris Woods, author of*** **Sudden Justice: America's Secret Drone Wars,** ***in an article in*** **DefenseOne.com,** ***May 31.***

New Apollo

"This is not something we are just approaching on with a relaxed strategy. This is almost an Apollo, getting-to-the-moon sort of approach we are going for. I am very confident in the ability within the United States to get this done."***—Lt. Gen. Samuel A. Greaves, commander of Air Force Space and Missiles Systems Center, briefing reporters on USAF efforts to build a new generation space launch system without using Russian-made engines, June 2.***

Aperture

By Marc V. Schanz, Senior Editor

Carter Raises South China Sea Stakes; China's New Military Strategy; Defense Reform ....

SEA WARNINGS

Defense Secretary Ashton B. Carter returned to Asia in late May and early June for his second trip to the region as Pentagon boss, delivering the Obama Administration's sharpest words yet regarding China's accelerated military construction activities in the South China Sea. He spoke at the annual Shangri-La Dialogue conference in Singapore, May 29-31. "There should be an immediate and lasting halt to land reclamation by all claimants," Carter said, adding that the US opposes any "further militarization of disputed features."

There was no mistaking, however, the claimant Carter was targeting with the broadside, acknowledging first the multiple claimants to the SCS and the outpost development by allies and emerging partners. (The Philippines has built eight, Vietnam has 48, he said.) "Yet one country has gone much further and much faster than any other, and that is China," Carter said. "China has reclaimed over 2,000 acres, more than all other claimants combined, and more than in the entire history of the region. And China did so in only the last 18 months."

Carter said it is "unclear how much farther China will go," but the US, he said, is "deeply concerned" about the pace and scope of reclamation and further militarization of land features in the sea, as they increase the risk of miscalculation or conflict among the various claimants. These actions put China out of step with the "regional consensus that favors diplomacy and opposes coercion."

Carter's stance was previewed prior to his arrival in Singapore, at the US Pacific Command change-of-command ceremony in Hawaii in late May, where Adm. Harry B. Harris Jr. took over for the retiring Adm. Samuel J. Locklear. Harris had already come out as a vocal critic of China's South China Sea buildup, when in a March speech in Australia he called the Chinese effort the "Great Wall of Sand" and said the activity raised "serious questions about Chinese intentions" with regard to its neighbors in the region. Prior to leaving PACOM, Locklear testified before the Senate in April, saying the reclamation activity has included the construction of new port facilities and airfields capable of hosting military aircraft.

There are indications China will move more aggressively to now assert control over the sea.

Before Carter's arrival in Singapore, the Chinese military warned a US Navy P-8 surveillance aircraft eight times to depart a "military alert zone" during a May 20 flight over the sea, from a People's Liberation Army Navy detachment on Fiery Cross Reef. The crew responded that the aircraft was conducting activities in international airspace. Fiery Cross Reef reportedly now hosts an early warning radar installation and a control tower, raising fears amongst US officials and Southeast Asian states that the Chinese intend to declare an air defense zone similar to the one China announced in late 2013 in the East China Sea.

The presence of an early warning radar indicates air defenses may soon be installed as well. US defense officials speaking with reporters on Carter's trip to Singapore also confirmed that surveillance now shows the Chinese have placed artillery pieces on one of the inlets, but they do not yet threaten US ships or aircraft.

In his speech, Carter said the US would "continue to protect freedom of navigation and overflight" in the South China Sea and across the region, and the US military will "not be deterred" from operating in international airspace and waters, as is the right of all nations. "There should be no mistake: The United States will fly, sail, and operate wherever international law allows, as US forces do all over the world."

Adm. Sun Jianguo, deputy chief of the PLA's general staff, declared during his speech at Shangri-La that the construction activities "fall well within the scope of China's sovereignty and are legitimate, justified, and reasonable." He said the improvements are meeting "necessary defense needs" for China's outposts and are primarily geared toward maritime search and rescue activities and protection of fishery, maritime research, and meteorological observation activities. "The scale and pace of its construction is in line with the international responsibilities and obligations China assumes in the South China Sea," he stated.

However, Sun refused to rule out the creation of an air defense zone, like the one in the East China Sea. "Whether there is a plan to set up an air defense identification zone depends on risks to our air safety and the degree of threat, as well as taking into consideration all [other] aspects."

A GLOBAL STRATEGY

The fact that China dispatched a high-ranking member of the PLA general staff to address the proceedings in Singapore, and rebuke US charges of unilateralism, should not have come as a surprise to Pentagon officials. Only days before the event, China released an unprecedented "military strategy," in both Mandarin and English, just over two weeks after the Pentagon released its annual China military and security report to Congress.

China's report contains sections that discuss the challenges posed by "provocative actions" by some of its "offshore neighbors" around its immediate periphery in the East and South China seas. It also puts down a bold marker for how the PLA is increasingly embracing its role as the global protector of Chinese interests around the world, requiring enhancing partnerships and investing in power projection capabilities and the tools to enable them. The paper acknowledges the US' "rebalancing" strategy in the Asia-Pacific, conceding that this strategy is driven by the world's economic and strategic forces shifting toward the region and prompting the US to enhance its military alliances and presence across Asia. These include its treaty obligations with Japan.

Rather than a limited focus on securing its territory and reintegrating Taiwan, the paper stresses that the country "enjoys growing international standing and influence" and

thus must face "multiple and complex security threats, as well as increasing external impediments and challenges." In response to China's "growing strategic interests" the PLA is now committed to "actively participate in both regional and international security cooperation" to effectively secure China's "overseas interests." The paper then lists the defense of China's territory and its territorial claims at the top of the PLA's list of strategic tasks, but also charges the armed forces with protecting the country's interests in "new domains."

Despite China's prolonged period of modernization in its military, both independent analysts and DOD's annual assessments note the PLA still lacks capacity in critical areas where the US has long enjoyed superiority, such as a robust and layered global intelligence, surveillance, and reconnaissance network and sustainable global combat mobility. However, a pronounced theme of China's new strategy is emphasizing the PLA's embrace of operating beyond its borders and "near seas." This includes the need to invest in and develop more refined operating concepts similar to the US military, such as expeditionary deployment of combat troops, humanitarian and disaster relief operations over long distances, and the projection of air and naval forces over long distances. The People's Liberation Army, for example, will continue to adapt from "theater defense" to "trans-theater mobility," by emphasizing the construction of "multifunctional and modular" units that can be utilized for both noncombat and combat scenarios. These forces will be capable of joint operations with the other PLA services, the paper states, and will be able to self-sustain while carrying out tasks with precision, across theaters.

The strategy openly reveals China's desire to enable its forces to operate at longer distances, on the open seas and in the air, as well as exploit both space and cyberspace to achieve its goals. The PLA Navy will also gradually shift its central focus from protecting China's "offshore" to a combination of offshore and open seas protection. This demands a combined, multifunctional marine combat force structure and requires the PLAN to enhance tools for "strategic deterrence and counterattack, maritime maneuvers," and "joint operations at sea."

The PLA Air Force, also, will shift its focus from "territorial air defense" to both "defense and offense" and will build an "air-space defense force structure" that can successfully prosecute "informationized operations." To support these tasks, the PLAAF will increase investments in strategic early warning tools, air strike capabilities, air and missile defense systems, "information countermeasures," airborne operations, and "strategic projection"—specifically "medium- and long-range precision strikes."

To do all of this, China will press to address the problems "constraining the capabilities for system [vs.] system operations," the strategy states, to include building up a more robust ISR network, and more capable command and control tools. Much like the Pentagon's recent reports point out, China seems intent on closing the gaps in C2 and "theater-level command systems" for the PLA, to aid its global ambitions in the next decade.

REFORM PRESS ON CAPITOL HILL

As the defense authorization and appropriations bills work their way through Congress, a bipartisan group of think tank experts have petitioned both the congressional Armed Services committees and the Appropriations committees to take action on three needed reforms inside the Department of Defense: closing excess infrastructure, reducing and restructuring the federal defense civilian workforce, and comprehensively addressing the military compensation system.

Calling their effort the "Defense Reform Consensus," 39 leading defense experts, from organizations as diverse as the Hoover Institution to the Stimson Center and the American Enterprise Institute, released an open letter on April 29 addressed to the congressional committee chairs and Secetary Carter declaring that the "urgency for change is even greater" than when the group urged action on the topics back in 2013. The group's letter was followed with a May 14 event held on Capitol Hill, featuring addresses and support from HASC Chairman Rep. Mac Thornberry (R-Texas), Ranking Member Rep. Adam Smith (D-Wash.), as well as Sen. Angus King (I-Maine), and Rep. Randy Forbes (R-Va.), chairman of the House Armed Services Committee seapower and projection forces panel.

The DRC signatories give some credit to Congress and the Obama Administration for "some incremental and modest changes that begin to bend the cost curves in personnel, compensation, and infrastructure," the letter states. By and large, however, "difficult trade-offs have been deferred," and this will make needed change much harder to accomplish as time goes on. Given the gravity of the presidential election cycle, the signers of the letter concede that any action on these questions "will surely be deferred until 2017, or later, if another year is lost." In the meantime, combat power will suffer and America's adversaries will become "more capable of contesting US interests around the world."

The DRC says a new base closure round is overdue, even though DOD's inventory of buildings remains at 2.2 billion square feet and 86 percent of this space is in the United States. "Meanwhile the military services have arguably drawn down too far in overseas basing," the letter states. Congress should work with DOD "to identify the true scale of excess capacity and better match" its facilities to its smaller force.

The size and structure of DOD's civilian workforce also needs urgent attention, the petitioners say, stating that from 2001 to 2014 the Active Duty military shrank by some three percent, yet the number of civilian DOD employees grew by 10 percent, to 756,000 and another three percent in just the last year alone, creating a workforce that is "now out of proportion to need." While select cuts have been made, it is not clear if these have been matched to a downsized military or a shifting military strategy, and DOD does not appear to have the necessary information on hand to assess "the most efficient balance between contractors, civilians, and military personnel." Getting this information is vital to bringing the workforce back into balance, and the Pentagon also needs to "de-layer" headquarters organizations across the military and optimize "spans of control to enable better performance at lower cost."

The signers tout the work of the Military Compensation and Retirement Modernization Commission, declaring that Congress has yet to act in a "holistic manner" on these issues and should bring the commission's recommendations to a vote this year.

During the May 14 event, Thornberry declared he was supportive of the DRC letter, but change will likely be incremental rather than comprehensive and will have to be reconciled with the Senate's wishes as well. There are some provisions addressing all three of the areas the letter talks about in the House version of the defense authorization bill, he said, but there are others that are more challenging, such as reworking Tricare. He noted the House bill does not allow another BRAC, but does require DOD to come up with an updated assessment of its infrastructure and what is "excess or insufficient," rather than relying on the 20 percent figure that dates back to the 2005 BRAC. "I don't pretend in any of these areas we have done enough. ... It is a start," Thornberry said. ✪

Air Force World

C-17 Fleet Hits Three Million Flight Hours

The C-17 fleet reached three million flight hours on May 5, according to an Air Force release. "It has become the airlifter of choice for our Air Force," said Col. Amanda Meyers, C-17 system program director.

Ceremonies were held at Robins AFB, Ga., and JB Charleston, S.C., to commemorate the event.

The Air Force owns 222 Globemaster IIIs, and eight partner nations have 44 of the strategic airlifters. The first C-17 made its maiden flight on Sept. 15, 1991, and the first aircraft was delivered to USAF in June 1993.

X-37B Returns to Orbit

A United Launch Alliance Atlas V rocket blasted off from Cape Canaveral AFS, Fla., at 11:05 a.m. on May 20, carrying the X-37B Orbital Test Vehicle.

The launch marked the fourth time the unmanned space plane has deployed into low Earth orbit, with all missions



USAF photo by Ken Wright

launched aboard Atlas V rockets. The current X-37B mission carries important new USAF experiments, such as the Hall thruster, used to improve similar units onboard Advanced Extremely High Frequency communication satellites.

The Air Force plans to continue using the spacecraft to test reusability concepts in space. The launch marked the 83rd successful launch of the Evolved Expendable Launch Vehicle, noted Space and Missile Systems Center Commander Lt. Gen. Samuel A. Greaves in a statement.

The AFSPC-5 mission included 10 CubeSats on the rocket's Centaur upper stage, a collaboration between SMC and the National Reconnaissance Office.

NATO Gets a Global Hawk

Northrop Grumman rolled out NATO's first RQ-4 Global Hawk Alliance Ground Surveillance aircraft during a ceremony at Palmdale, Calif., in early June, the company announced.



06.08.2015

Two B-52H Stratofortress pilots maneuver behind the lead aircraft to complete a simulated air strike during Saber Strike 15 in Europe. During the exercise, B-52s deployed from Minot AFB, N.D., to RAF Fairford, UK, to fly missions with European allies.

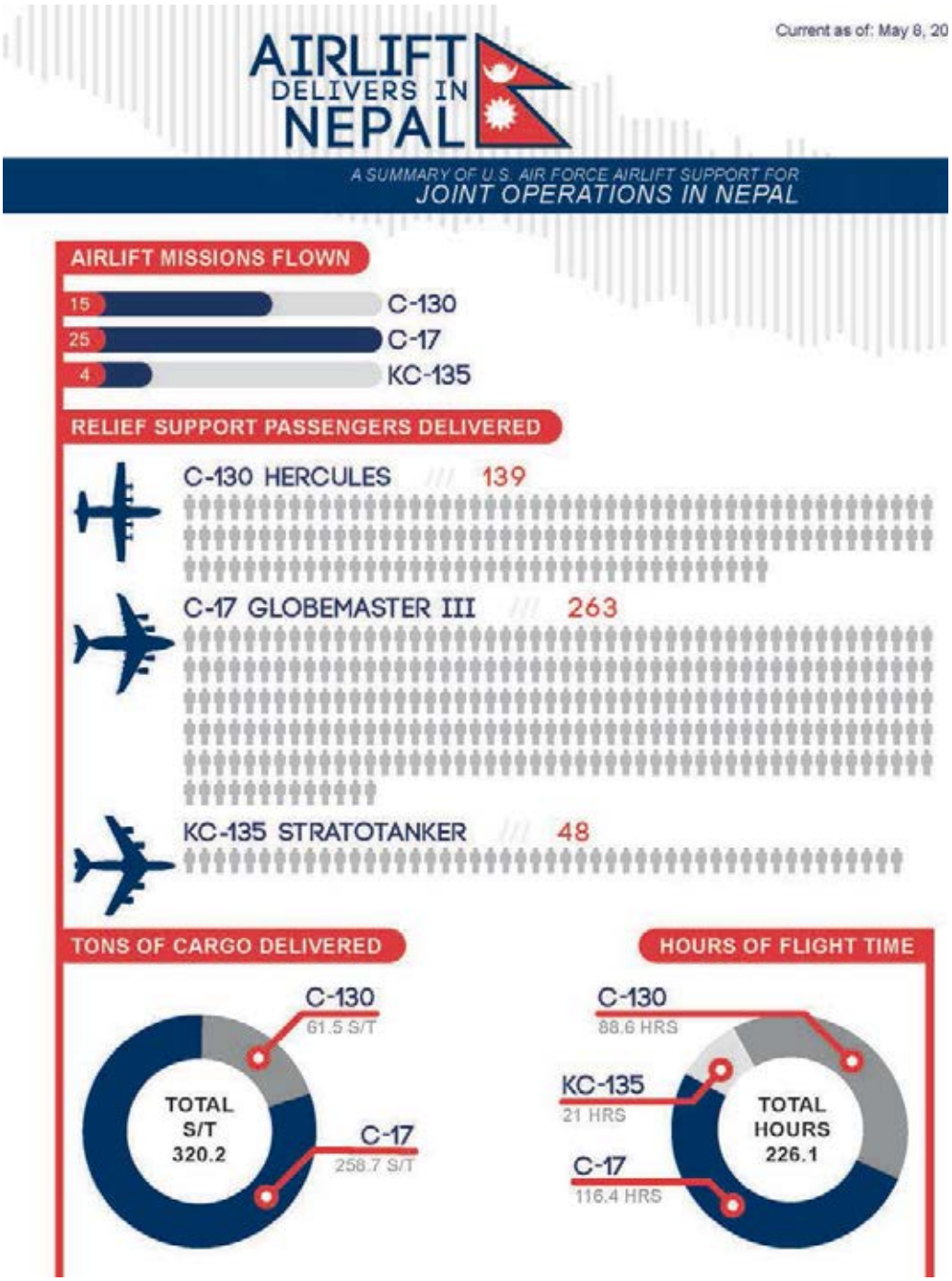
USAF photo by SrA. Malia Jenkins

"What you see here today is the result of one of the commitments made at the 2012 NATO Summit—to bring this advanced and critical persistent ISR capability to the Alliance to help ensure we can continue to address the range of challenges our member and other allied nations face," said Erling Wang, chairman of the NATO AGS Management Agency.

Fifteen nations are contributing to the delivery of the NATO-owned and -operated program that will comprise five Global Hawks, and all 28 NATO nations will participate in long-term support of the program, according to officials.

The remotely piloted aircraft will be based at Sigonella AB, Italy, and the Alliance is in the process of "establishing the necessary ground stations, command and control systems, and training and logistics support services" there, said Jim Edge, NATO AGS general manager.

By the Numbers



Source: Air National Guard

Lightning School Starts at Luke

The F-35 schoolhouse at Luke AFB, Ariz., began training its first formal class of student pilots in May, officials announced.

"The pilots going through the training right now are going to be staying here at Luke to be instructors," said 56th Training Squadron operations director Lt. Col. Matt Hayden in a press release. "When they graduate they may very well turn around in a matter of days to instructing students in what they just learned."

The four pilots—two A-10 and two F-16 pilots—are already rated instructor pilots and were competitively selected for the F-35 course that began May 4.

Luke's 56th Fighter Wing commander, Brig. Gen. Scott L. Pleus, flew the first F-35A training sortie at the base back in March, ahead of the first training class. Luke will eventually host 144 US and allied strike fighters.

Osprey's Pacific Post

Air Force Special Operations Command will station a squadron of 10 CV-22 tilt-rotor aircraft at Yokota AB, Japan, the Defense Department announced.

Yokota's first three CV-22s will arrive in the second half of 2017; the remaining seven are scheduled to touch down by 2021.

This beddown aims to enhance US special operations forces' capacity to quickly deploy for contingencies or disasters in Japan and across the Asia-Pacific region, as well as partner with Japan Self-Defense Forces.

The Pentagon notified Congress several weeks earlier of a proposed foreign military sale of 17 V-22Bs to Japan. It would make the country the Osprey's first export customer.

CV-22s operate today at Hurlburt Field, Fla., Kirtland AFB, N.M., and RAF Mildenhall, UK. Mildenhall's Osprey's are expected to relocate to Germany when Mildenhall closes.

Buzzards Over Sweden

The Swedish government invited F-16s from Aviano AB, Italy, to take part in the multinational Arctic Challenge Exercise at Kallax Air Base, near the northern city of Luleå, this spring.

Twelve jets and approximately 150 pilots, maintainers, and support personnel from the 510th Fighter Squadron

William F. Andrews, 1958-2015



One of the most decorated airmen of the 1991 Gulf War, retired Col. William F. Andrews, died June 8 of brain cancer. He was 56.

Andrews received the Air Force Cross as a captain for heroism, following his being shot down on Feb. 28, 1991. While hanging in the straps of his parachute—and even after breaking a leg on landing and coming under fire from advancing Iraqi ground troops—Andrews continued communicating on his handheld radio, warning two other aircraft to break away and launch flares in response to missiles he saw being fired at them. He was captured, beaten, and held prisoner for eight days, for which he received the POW Medal (See: "Call From the Desert," February 2011).

Andrews earned two awards of the Distinguished Flying Cross with V for valor in previous Desert Storm actions: one for attacking a heavily defended Scud missile plant and another for providing close air support for a Special Forces team that was trapped under heavy fire. The team was safely extracted due to his action. In all incidents, Andrews was under continuous fire from missiles, anti-aircraft guns, and small arms. Andrews also received the Legion of Merit as a colonel, for managing large-scale rapid deployments of force for operations Noble Eagle and Enduring Freedom, while commander of the 366th Wing Operations Group at Mountain Home AFB, Idaho. Andrews served on the Joint Staff at the Pentagon from March 2002 to June 2004 and then taught at the National Defense University and Industrial College of the Armed Forces, both at Fort McNair, D.C., until his retirement in June 2010.

In 1998 he wrote the book *Airpower Against an Army,* chosen for the Chief of Staff's senior officer reading list.

flew alongside NATO and Partnership for Peace nations' air forces during the exercise, held May 25 to June 5, according to a release.

"The aim is to exercise and train units in the orchestration and conduct of complex air operations, in close relations to NATO partners," exercise director Royal Norwegian Air Force Brig. Gen. Jan Ove Rygg said in a RNoAF news release.

Arctic Challenge is jointly hosted by Finland, Sweden, and NATO-member Norway, across the far north. It is one of the largest fighter exercises in Europe, including some 100 aircraft and 4,000 personnel from nine countries.

Sweden has upped cooperation with NATO and even floated the idea of joining the Alliance in light of increased Russian military threats to the region.

Delta Over NYC: *US Air Force Thunderbirds fly their signature six-ship delta formation past One World Trade Center during a photo mission over New York City on May 22. With this flyby, the aerial demonstration team and a photo ship promoted Fleet Week in the city and the Bethpage Air Show at Jones Beach on Long Island.*

USAF photo by SrA. Jason Couillard

USAF photo by SSgt. Ryan Crane



Black Ice, Ice Baby: *A security forces airman trains at Ramstein AB, Germany, safeguarding a hardened facility after first neutralizing an opposing force. Part of a Battlefield Leaders Assaulter Course-Integrated Combat Essentials, or BLAC ICE, the course teaches and integrates advanced tactics and shooting skills to use in case of a breach in base security. Security forces members from several countries take the course.*

Tyndall's Last, Feisty Phantom

The last QF-4 unmanned aerial target assigned to Tyndall AFB, Fla., was shot down May 27 by Florida Air National Guard and 53rd Weapons Evaluation Group F-15C pilots, USAF spokesman 1st Lt. Christopher Bowyer-Meeder told *Air Force Magazine.*

The target drone was hit by three missiles, a combination of AIM-120s and AIM-9s, during Operation Quick Draw "before it finally died," said Bowyer-Meeder. "So, it went down fighting."

The QF-4 fleet is being replaced by QF-16 full-scale aerial targets, modified from legacy F-16s. Eight are already operating with the 53rd WEG.

QF-4s will continute to fly from Holloman AFB, N.M., for "another one to two years before being completely retired," according to a USAF release.

Vipers in the Lion's Den

Six F-16s and crews from the 480th Fighter Squadron at Spangdahlem AB, Germany, deployed to Ben Guerir AB, Morocco, from May 15 to 22, to take part in joint and combined air training as part of Exercise African Lion.

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Combat Air Patrol Relief

Defense Secretary Ashton B. Carter approved dropping the number of combat air patrols flown from 65 to 60 as part of an overarching effort to rebalance operational demands on remotely piloted aircraft crews.

Air Force leaders hope the "CAP reset" will alleviate the surge footing in the RPA community, according to a May 20 news release. Air Force Secretary Deborah Lee James and Chief of Staff Gen. Mark A. Welsh III have repeatedly stated that the Air Force must find a way to balance risk in areas such as retention, training, manning, and combat capability in the RPA force.

USAF Active Duty RPA pilot production stands at 180 pilots a year, but demand stands at 300 pilots a year, Welsh noted. USAF plans to add 100 more pilot graduates to its pipeline a year, but this won't be an easy task because there also is a shortage of RPA instructors. RPA training squadrons at Holloman AFB, N.M., are staffed at 63 percent, according to a recent Government Accountability Office report.

In addition to previously announced incentives, the service is working on more funding for its RPA schoolhouse capacity, increased reserve component augmentation days, and some contracted RPA recovery efforts.

—Marc V. Schanz

The War on Terrorism

Casualties

As of June 18, a total of three Americans had died in Operation Freedom's Sentinel in Afghanistan, and seven Americans had died in Operation Inherent Resolve in Iraq and Syria.

The total includes nine troops and one Department of Defense civilian. Of these deaths, two were killed in action with the enemy, while eight died in noncombat incidents.

There have been 25 troops wounded in action during OFS and one troop in OIR.

US Training Syrian Rebels

The US started training the first group of 90 moderate Syrian fighters, Defense Secretary Ashton B. Carter announced on May 7.

The fighters, described as "highly vetted," should be ready to begin fighting ISIS extremists within a "few months," though Carter emphasized that they are not being trained to fight against Syrian President Bashar Assad's forces.

The Syrians will be trained and armed by US troops in a "secure location" and, if necessary, will be supported in battle by US forces, with airborne intelligence, surveillance, and reconnaissance, as well as air strikes, Carter said.

"Of course we would have some responsibility to protect those forces," he said at a Pentagon briefing.

"Their mission would be to fight [ISIS]. ... We do expect to support them in that regard. If they are contested by regime forces again, we would have some responsibility to help them," he said when questioned.

Asked how the US would keep the trained Syrians from attacking Assad, who was the target when the civil war started two years ago, Carter said that would be influenced by where they were positioned and how they were trained. "They are not being asked by us, and it's not part of our program," for them to fight Assad's forces, he said.

—Otto Kreisher

Back, With a New Job

The Air Force reactivated the 332nd Air Expeditionary Wing at an undisclosed Persian Gulf nation as part of the buildup of in-theater infrastructure to support Operation Inherent Resolve.

With more aircraft and missions operating from the base, US Air Forces Central Command redesignated the 332nd Air Expeditionary Group as a full-fledged AEW. Col. Michael G. Koscheski took over command of the unit during a May 19 ceremony at the new wing. Koscheski declared that the wing would be "expanding in terms of mission sets" in the near future.

The 332nd AEW eventually will incorporate a rescue group to support OIR taskings within the region and will add an air advisory group to assist Iraqi air force, army, and aviation assets to grow in capability.

The 332nd AEG stood up late last year in the Gulf region to support USAF deployments for OIR, including A-10s and other resources.

"We've come a long way, but there's much more to be done," said Maj. Gen. Peter E. Gersten, commander of the 9th Air and Space Expeditionary Task Force. The 332nd AEW inactivated previously in 2012, after supporting combat operations in Operation Iraqi Freedom and Operation New Dawn.

The exercise is the largest Department of Defense training event in Africa, and it marks the first year the US Air Force is participating in the event. It is led by the US Marine Corps.

In addition to the airmen from Spangdahlem, Air National Guard and Air Force Reserve Command airmen participated in the event, flying with Royal Moroccan Air Force F-16 pilots and participants from Belgium, Germany, the Netherlands, Senegal, Tunisia, and the United Kingdom.

The exercise included RMAF F-16s in in-flight air refueling with US tanker aircraft and emergency landing barrier training.

Morocco is a close ally of the Gulf Cooperation Council nations and began fielding 24 new Block 52 F-16s in 2011.

Now, But a Spectre

Air Force Special Operations Command retired the final AC-130H Spectre gunship, serial No. 69-6569, at Cannon AFB, N.M., closing out 46 years of service. Hundreds of spectators gathered along the flight line to watch *Excalibur's* final flight, May 27.

"Over the last 12 years, the 16th [Special Operations Squadron] has flown over 6,500 combat sorties, 26,000 combat hours, and has been responsible for over 4,600 enemies killed in action, along with 5,200 enemy captures," said Capt. Aaron Magger, 16th SOS navigator, in a news release.

AFSOC plans to procure 37 AC-130Js—the first already in testing—to replace its legacy AC-130Hs, AC-130Us, and AC-130Ws. In addition to divesting its H-model fleet, the command is phasing out three of its U models in Fiscal 2015, leaving 26 legacy gunships until Ghostrider comes online.

High Northern Watch

NORAD sent air defense fighters to remote forward operating locations in the far north and High Arctic for Exercise Amalgam Dart in May, Canadian defense officials announced.

"Amalgam Dart challenges our forces to deploy and operate in the most challenging environment our continent has to offer," NORAD regional commander Royal Canadian Air Force Maj. Gen. David Wheeler said in a press release.

"This year will have the unique component of pushing our personnel to perform their mission in the most northern limits of our area of responsibility," he said.

Three hundred Air Force and RCAF personnel and 15 jets deployed May 25 to June 1 to bases in Alaska and Canada to practice coordinating and responding to air threats.

F-15s deployed to FOL Yellowknife and RCAF F-18s to FOL Inuvik in Canada's northwest, while a mobile radar station was set up in the High Arctic, according to the release. In Alaska, F-22s staged from JB Elmendorf-Richardson, Alaska, and Air Force KC-135 and RCAF CC-150 tankers staged from Eielson AFB, Alaska.

First E-4B Rolls Through San Antonio

Boeing recently completed the first depot-level maintenance of an E-4B National Airborne Operations Center aircraft at its San Antonio facility, the company announced.

"Boeing's ability to return this aircraft to service, ahead of schedule, benefits the men and women who serve on them, as well as the citizens they protect," Air Force E-4B section chief Joseph Stupic said in a May 20 company news release.

Senior Staff Changes

NOMINATIONS: To be Major General: Michael D. **Rothstein. To be Brigadier General:** Christopher E. **Craige.**

CHANGES: Brig. Gen. Robert G. **Armfield**, from Dep. Cmdr., NATO, Spec. Ops. Component Command-Afghanistan, CENTCOM, Southwest Asia, to Dep. Dir., Strategy, Plans, & Policy, CENTCOM, MacDill AFB, Fla. … Brig. Gen. (sel.) Paul E. **Bauman,** from Cmdr., 319th Air Base Wg., AMC, Grand Forks, N.D., to Dep. Dir. for Future Jt. Force Dev., Jt. Staff, Suffolk, Va. … Brig. Gen. William T. **Cooley,** from Sr. Materiel Leader & Dir., GPS Directorate, SMC, AFSPC, Los Angeles AFB, Calif., to PEO, Prgms. & Integration, Office of the USD, Acq., Tech., & Log., Missile Defense Agency, Redstone Arsenal, Ala. … Brig. Gen. (sel.) Christopher E. **Craige,** from Dir., AF General Officer Mgmt., DCS, Manpower, Personnel, & Svcs., USAF, Pentagon, to Cmdr, 438th AEW, ACC, ISR, SOUTHCOM, Southwest Asia … Brig. Gen. Thomas W. **Geary,** from Dir., ISR, SOUTHCOM, Miami, to Dir., ISR Strategy, Plans, Doctrine, & Force Dev., DCS, ISR, USAF, Pentagon … Maj. Gen. (sel.) David A. **Harris,** from Cmdr., 96th Test Wg., AFMC, Eglin AFB, Fla., to Cmdr., AF Test Center, AFMC, Edwards AFB, Calif. … Maj. Gen. (sel.) James B. **Hecker,** from Dir., Plan, Prgms., & Rqmts., ACC, JB Langley-Eustis, Va., to Cmdr., 19th AF, AETC, JBSA-Randolph, Texas … Lt. Gen. John W. **Hesterman III,** from Cmdr., AFCENT, ACC, Southwest Asia, to Asst. Vice C/S, Air Staff, Pentagon … Brig. Gen. (sel.) Kevin A. **Huyck,** from Cmdr., 1st FW, ACC, JB Langley-Eustis, Va., to DCS, Ops., Allied Air Command, Allied Command Ops., NATO, Ramstein AB, Germany … Maj. Gen. James R. **Marrs,** from Dir., Intel., CYBERCOM, Fort Meade, Md., to Dir., Intel., Jt. Staff (Defense Intel. Agency), Pentagon … Gen. Darren W. **McDew,** from Cmdr., AMC, Scott AFB, Ill., to Cmdr., TRANSCOM, Scott AFB, Ill. … Maj. Gen. Jon A. **Norman,** from Vice Cmdr., PACAF, JB Pearl Harbor-Hickam, Hawaii, to Dir., Global Power Prgms., Asst. SECAF for Acq., OSAF, Pentagon … Maj. Gen. (sel.) Michael D. **Rothstein,** from Cmdr., 438th AEW, ACC, Southwest Asia, to Dep. Asst. Secy. for Plans, Prgms., & Ops., Political-Mil. Affairs, US Dept. of State, Washington, D.C. … Gen. Paul J. **Selva,** from Cmdr., TRANSCOM, Scott AFB, Ill., to Vice Chairman, JCS, Jt. Staff, Pentagon … Brig. Gen. (sel.) Brad M. **Sullivan,** from Spec. Asst. to the Cmdr., SOCOM, MacDill AFB, Fla., to Dir., Intel. & Info., NORAD, NORTHCOM, Peterson AFB, Colo.

COMMAND CHIEF CHANGE: CMSgt. David P. **Klink,** from Command Chief, 65th Air Base Wg., USAFE, Lajes Field, Portugal, to Supt., SECAF/C/S of the AF Exec. Action Group, USAF, Pentagon.

SENIOR EXECUTIVE SERVICE CHANGES: David E. **Lambert,** to Chief Scientist, Munitions, Munitions Directorate, AFRL, AFMC, Eglin AFB, Fla. … Jennifer L. **Miller,** to Dep. Asst. Secy., Instl., Office of the Asst. SECAF, Instl., Env., & Energy, USAF, Pentagon … Suhithi M. **Peiris,** to Sr. Scientist, Enhanced Energy Effects, Munitions Directorate, AFRL, AFMC, Eglin AFB, Fla. … Jeffrey T. **Pennington,** to Dir. of Staff, AFRC, Robins AFB, Ga. … Greg **Zacharias,** to Chief Scientist of the AF, USAF, Pentagon. ▪

Boeing overhauled both the Air Force's 747-based E-4B and VC-25 platforms in Wichita, Kan., from 1974 until the company closed its facility there last year.

The Air Force's four NAOC aircraft are cycled through refit every two years. Boeing also reworks Air Force's C-17s, KC-135s, and commercial aircraft on the San Antonio line.

SpaceX Cleared for Launch

The Air Force certified California-based Space Exploration Technologies Corp.'s (SpaceX) Falcon 9 rocket to compete for national security space launches on May 26, following an extended two-year certification review.

"This is a very important milestone for the Air Force and the Department of Defense," Air Force Secretary Deborah Lee James said in a news release.

The move is expected to drive down the cost of expensive space launches while also improving "our military's resiliency," she said.

United Launch Alliance, a Lockheed Martin and Boeing consortium, has been the sole national security launch provider since it was formed in December 2006.

"The Air Force invested more than $60 million and 150 people in the certification effort, which encompassed 125 certification criteria, including more than 2,800 discrete tasks, three certification flight demonstrations, verifying 160 payload interface requirements, 21 major subsystem reviews, and 700 audits in order to establish the technical baseline from which the Air Force will make future flight worthiness determinations for launch," stated the press release.

Elon Musk, SpaceX CEO and lead designer, said, "This is an important step toward bringing competition to national security space launch. We thank the Air Force for its confidence in us and look forward to serving it well."

—Amy McCullough

F-16 Micro-Upgrade

The Air Force will upgrade "20-plus" F-16s with an active electronically scanned array radar in response to a joint urgent operational need from US Northern Command, service acquisition executive William A. LaPlante said.

He told *Air Force Magazine* that the jets will likely be Air National Guard aircraft of the 113th Wing, stationed at JB Andrews, Md., and tasked with defending Washington, D.C.

"The JUON we're acting on is focused not on the whole homeland defense mission" but on a "more focused" subset of it, he said.

The upgrade won't be applied fleetwide "in the first tranche," LaPlante said, but he didn't say whether it would later be expanded.

Farewell, West Virginia Galaxys

The West Virginia Air National Guard's final C-5A Galaxy airlifter flew to the "Boneyard" May 20, completing the 167th Airlift Wing's conversion to the C-17 Globemaster III.

Lockheed Martin saluted the conclusion of a 52-year partnership with the wing, spanning the C-121 Super Constellation, C-130 Hercules, and finally the C-5, during a ceremony May 19 marking the transition to a Boeing aircraft.

The 167th AW is the last of three ANG units to transition to the C-17 as part of the Air Force's plan to retire its oldest Galaxys and convert the remainder to C-5M Super Galaxy standards.The unit has received seven of its eight C-17s, the last slated to arrive in July, according to the unit.

Flying Transformers

Air Force Research Laboratory and NASA researchers recently completed a six-month program of flight testing morphing wing technology on a Gulfstream III jet at Edwards AFB, Calif.

"The purpose of these tests was to see if flexible trailing-edge wing flaps could improve aerodynamic efficiency and reduce the noise generated during takeoffs and landings," said Fay Collier, a NASA project manager.

The FlexFoil technology exceeded expectations, paving the way for its incorporation by the military and commercial aviation industries, states the press release.



USAF photo by SrA. Nicole Sikorski

D-Day Commemoration: ***A C-130J Super Hercules from the 37th Airlift Squadron flies over Normandy, France, on June 3, marking the 71st anniversary of D-Day. On June 6 in 1944, more than 160,000 Allied troops landed along the French coastline. Despite heavy casualties—9,000 killed or wounded—the Allies gained a foothold on the continent. For this anniversary, nearly 400 military personnel from Europe and from D-Day historical units participated in a week of events in Normandy. The 37th AS is based at Ramstein AB, Germany.***

"These flights cap 17 years of technology maturation," said Pete Flick, AFRL's program manager.

The tests took place under the Adaptive Compliant Trailing Edge program. The final flight test took place on April 22; the first of the 22 flights occurred on Nov. 6, 2014.

JASSM Like a CHAMP

The Air Force Research Lab is looking to take the next step in turning its CHAMP (Counterelectronics High-power Microwave Advanced Missile Project) into a fielded weapon, said AFRL chief Maj. Gen. Thomas J. Masiello.

A high-power microwave emitter mounted in an AGM-86B Conventional Air Launched Cruise Missile successfully fried all the electronics in a simulated command bunker in a 2012 test. AFRL is now aiming to miniaturize an HPM package that would "fit it into a JASSM-ER," Masiello said.

The JASSM-ER was a natural choice because "it's fielded and compatible with a whole host of platforms," he said. The weapon is also more survivable than CALCM, and CHAMP could easily take the place of JASSM-ER's kinetic warhead.

CHAMP was put together by Boeing, while JASSM-ER is built by Lockheed Martin.

My Dear Watson

The Pentagon is hiring Watson—IBM's super computer that defeated all-time "Jeopardy!" champions Ken Jennings and Brad Rutter in a 2011 exhibition match—to help interpret the inscrutable 5000 series of procurement rules, Air Force acquisition chief William A. LaPlante revealed.

"We're going to teach Watson" Federal Acquisition Regulations with the aim of "seeing how far [we] can go … in automation of some acquisition practices, where you have almost artificial intelligence."

He said that one experiment might be to feed a novel acquisition approach to Watson to see "if it's legal. We're going to teach it to be a lawyer."

LaPlante said the experiment is only one of a number of innovative acquisition ideas in play, such as creating a "big challenge" prize of $2 million for design of the most efficient next generation engine for remotely piloted aircraft. ✪

Lightning by the Numbers

The Air Force mapped out its operational F-35 base deployment plans through 2021, outlined by Air Force F-35 integration director Maj. Gen. Jeffrey L. Harrigian.

First up is Hill AFB, Utah. It gets its first operational jets in September, leading to initial operational capability in August 2016. Hill gets all its jets by 2019.

Next will be Eielson AFB, Alaska—a "preferred" location—which may get deliveries from July 2019 through November 2020. Eielson would get two squadrons of F-35s.

Burlington, Vt., gets its F-35s from July 2020 through May 2021, and RAF Lakenheath, UK—the first US overseas base—would get its aircraft from June 2021 through September 2022.

Other bases yet to be identified will follow. The F-35A is already deployed at Eglin AFB, Fla., on tap for 26 aircraft for pilot training, and Luke AFB, Ariz., slated to eventually have 144 jets, shared among the various F-35A partner countries.

Small numbers will also be permanent residents at Nellis AFB, Nev., and Edwards AFB, Calif., for tactics and test work, respectively.

Harrigian said there will be 651 F-35s of all variants in service worldwide with seven countries by the end of 2020. Some 123 F-35s of all models had been delivered by the end of May.

—John A. Tirpak

Don't Call it a Comeback

By **Amy McCullough,** News Editor



The Air Force isn't rebalancing to the Pacific. It never left.

The "Pacific Pivot" has been a popular term of art since the President outlined his new defense strategic guidance in 2012, but for airmen operating in the theater it just means business as usual.

"You hear a lot about the rebalance to the Pacific. I think that's true for the US as a whole, but for the Air Force … it's nothing new," Brig. Gen. Jeffrey R. McDaniels, director of air and cyberspace operations at Pacific Air Forces, told *Air Force Magazine* at JB Pearl Harbor-Hickam, Hawaii, in April. "We've been here over 80 years. We've never turned our back on it. We've never taken our eye off the Pacific. The Pacific is very important to us. Not just to us, but to the world as a whole."

More than half the world's population is located around the Asia-Pacific region, as are five of the world's 10 largest economies and five of the eight world nuclear powers. About 50 percent of the world's oil and more than 50 percent of all tonnage pass through the contentious waters of the South China Sea. Of the United States' seven mutual defense agreements, five are located in US Pacific Command's and PACAF's area of responsibility.

When compared to the Middle East, or even Europe following Russia's invasion of Ukraine, the Pacific is a relatively peaceful place, but there are plenty of fault lines in the region where potential conflict could erupt.

China is building up tiny disputed atolls and reefs in the South China Sea at an unprecedented rate—pumping sand, laying concrete, and claiming the artificial islands for facilities and airstrips.

The buildup is raising tensions in the region and encouraging other Pacific countries to strengthen maritime capabilities. For example, Malaysia now plans to park a repurposed oil platform off its coast and use it as a floating military base, said one PACAF official.

During a speech in Canberra, Australia, in March, Adm. Harry B. Harris Jr., commander of US Pacific Fleet, said, "China is creating a great wall of sand." PACAF Commander Gen. Lori J. Robinson raised a similar warning flag during the Air Force Association's Air Warfare Symposium in February.

The provocative actions are raising "serious questions about Chinese intentions," added Harris.



An F-22 Raptor assigned to JB Pearl Harbor-Hickam, Hawaii, is readied for flight. The Air Force is heavily investing in the units on US territory in the Pacific.

Staff photo by Amy McCullough

As the US looks to pare down its defense budget, China's officially disclosed military budget has increased by an average of 9.5 percent per year in inflation-adjusted terms from 2005 to 2014, according to the Pentagon's annual report on Chinese military modernization, released in May. China's spending is expected to continue at comparable levels for the foreseeable future.

In 2014, the People's Liberation Army continued to improve its cruise missiles; short- and medium-range ballistic missiles; high-performance aircraft; integrated air defense; information operations; and amphibious and airborne assault capabilities.

The Chinese air force also completed its first military drills over the Western Pacific on March 30, according to the state-run Xinhua News Agency. The drills aimed to increase China's "mobility and combativeness" in far offshore areas, said PLA air force officials.

Meanwhile, North Korea is a grave concern to South Korea, Japan, and even China. If North Korea continues to threaten nuclear warfare and flaunt its ballistic missile capabilities, it's not difficult to imagine surrounding countries going nuclear too, said the PACAF official.

PACAF OF THE FUTURE

In addition, Russia, which is expanding its military presence in the region, has flown its long-range bombers off the coast of California and around Guam. It also views the Arctic as an area of strategic importance.

Despite the focus on the region, there isn't likely to be a build up of new bases in the next 10 to 20 years, said Brig. Gen. Steven L. Basham, director of PACAF strategy, plans, and programs.

Former PACAF Commander Gen. Herbert J. "Hawk" Carlisle coined the phrase "places not bases" to describe the Air Force's preferred regional engagement approach. Robinson has kept the motto as part of the PACAF lexicon, though she modified it slightly to emphasize the importance of airmen serving as "ambassadors" each time they engage with allied or partner countries.

That's the PACAF of the future, said Basham.

Through theater security cooperation and building partnership capacity events, "I see us operating from more locations, training, gaining familiarization, being prepared for whatever requirement comes," he said.



Chinese paratroopers jump from a transport aircraft during an exercise. China's aggressive buildup in the South China Sea is raising tensions in the region.

Photo via International Communication Bureau of the Ministry of National Defense of the People's Republic of China

"As an example, we would see ourselves in Australia in the future. There are a lot of discussions going on with the Philippines right now, and certainly the buildup in Guam."

As the Marine Corps looks to relocate thousands of marines from Okinawa, Japan, to Guam by the early 2020s, Basham said the Air Force is looking "for an increased presence [on] Guam."

The island itself is small—just 30 miles long and about seven miles wide—but the strategic importance of Andersen AFB, Guam, was evident during a visit to the base in April. Almost everywhere you look, there is a construction project underway.

Northwest Field, for example, was mostly jungle in 2006. Today it hosts more than a dozen buildings, including the growing Pacific Regional Training Center and the Army's Terminal High Altitude Area Defense battery. Andersen officials are working to clear another 70 acres of vegetation for a new assault landing strip and parachute drop zone, said Stephen Wolborsky, director of the 36th Wing's plans, programs, and readiness directorate.

SPEEDING THINGS UP

In addition to the Marine Corps buildup on the north ramp, in Fiscal 2014, contracts were awarded to harden some of the base's fuel storage and build two large hardened hangars intended to modernize the base's maintenance capability, said Wolborsky. The Navy is constructing a hangar for its MQ-4 remotely piloted aircraft, expected to arrive at Andersen in the next three years.

In Fiscal 2015, Congress authorized funding for a corrosion control maintenance facility, although it ultimately was not appropriated. The President's Fiscal 2016 budget again requests funding for the facility, as well as funds for a warehouse to store resiliency products, a hardened command post, and some more utility work on the south ramp to upgrade the base's underground infrastructure.

Andersen officials are hoping to build a joint deployment-processing center near a new freight terminal, to "optimize the logistics flow" and "speed things up," said Wolborsky.

The 554th RED HORSE Squadron at Andersen has been working since 2006 to build up the Pacific Regional Training Center.

Although all service components have worked on the project, slated for completion in 2016, the 554th RHS dedicated 8,000 man-days in Fiscal 2014 alone to it. The troop labor significantly reduced the estimated cost of the proj-



SSgt. Bruce Green repairs a crater during airfield damage repair training in Guam as part of a Silver Flag exercise aimed at honing expeditionary skills.

USAF photo by SSgt. Melissa B. White



USAF photo by SrA. Benjamin Wiseman

Marine Corps Osprey helicopters park at Andersen AFB, Guam, as part of the exercise Forager Fury in 2012. The USMC will have relocated thousands of marines from Okinawa, Japan, to Guam, by early in the next decade.

ect from $251 million to $200 million and enabled the center to reach initial operational capability two years early, said Lt. Col. Andrew DeRosa, 554th RHS commander.

Exercise Silver Flag relocated from Kadena AB, Japan, to Andersen in October 2014. The move was made in part to reduce the Air Force's footprint on Okinawa, but it also allows USAF to bring a large contingent of students from other countries to the island. Although Silver Flag operated at Kadena from 1989 to 2013, USAF was restricted from training other nations on Japanese soil.

"We don't have that restriction here," said Lt. Col. Kevin A. Mares, head of Silver Flag training at Andersen. He noted that in June instructors there planned to train engineers from Singapore and Taiwan.

Today, Silver Flag is part of the expanding PRTC at Andersen. Some 1,200 Air Force engineering and force support students are trained in 13 Air Force specialty codes on the campus each year on subjects from airfield damage repair to bare base electrical layout and reverse osmosis water purification.

Beginning in the second quarter of Fiscal 2016, USAF plans to reincorporate explosive ordnance disposal into Silver Flag training, said Mares. The training was part of the curriculum "until about 2000, but due to the high [operations] tempo for EOD airmen, they didn't have the manpower to support all the deployments [to Afghanistan and Iraq] as well as the training," Mares said in an April interview. Now that combat operations in Afghanistan have wound down and the US presence in the country is getting smaller, EOD can return to the curriculum.

The Air Force is in the "infancy" stages of instituting large-scale changes to the way it repairs runways after an attack. EOD will play a major role in this new methodology, said Mares.

FILLING A HOLE

"We are currently still teaching legacy airfield damage repair field methodology … based on Cold War technology and … threats … but there are some new and improved threats from adversaries in the region that have forced us to come up with a new methodology for recovering airfields," he said. "We have always trained to the threat of fixing three 50-foot craters in four hours. Now, the new threat is going to be potentially 20 to 100 six-foot craters, so there are going to be many more pieces of damage, but of a smaller nature."

There are more than 5,500 missiles pointed at US forces and allies in the region, said Maj. Justin Pendry, PACAF legislative liaison. In an effort to address the threat, Pacific Air Forces is positioning airfield damage repair kits at locations throughout its area of responsibility to enable remote bases to quickly get runways up and running in the event of an attack.

Because of its strategic location in the Pacific and its two runways, Andersen will get four of the kits. One for the 554th RED HORSE, two for the 36th Civil Engineering Squadron, and one for Silver Flag training, enabling instructors to introduce PACAF airmen to the new technology, said DeRosa.

The large kits are designed to provide everything crews need to fill a crater in the event of an attack, including heavy construction equipment such as rollers, dump trucks, and bulldozers, DeRosa said. "They are coming in piecemeal over the next several months," he said of the equipment.

PACAF will standardize the kits across the region, though it is scaling the kit sizes based on need. As for Andersen, "the expectation is [that an adversary] would send more missiles our way to take out more of the runway and we'd have more runway to repair," DeRosa said.

The actual method for filling the holes is changing. Instead of using compacted dirt and then topping it with a folded fiberglass mat, the Air Force is moving to a process called flowable fill—"more of a very thick slurry" used to fill the crater, said DeRosa. "It's quicker because you pretty much just pump it into a hole, skim it off, and let it set."

Flowable fill is a semi-permanent repair designed to sustain thousands of aircraft passes, said Maj. Robert Liu, expeditionary programs chief at the Air Force Civil Engineer Center (AFCEC) at Tyndall AFB, Fla.

There are three lines of runway repair: repair, mitigation, and assessment. The kits are intended for repair only, though



RED HORSE airmen float concrete at a runway training area on Guam. USAF has been moving toward a crater-filling method called flowable fill.

USAF photo by SrA. Marianique Santos

AFCEC is researching ways to improve the other two lines.

The goal is to take the human factor out as much as possible. For example, the center has already started testing a three-kilowatt Zeuss III laser and robotic arm, to be mounted on mine-resistant, ambush-protected vehicles, said Liu.

Dubbed the Recovery of Air base Denied by Ordnance, or RADBO, system, the laser is meant to neutralize unexploded ordnance and improve UXO removal capability.

As Afghanistan operations draw down, the Defense Department is looking to distribute the abundance of MRAPs acquired over the last 13 years of war to other theaters. PACAF will take ownership of 45, most to be placed in storage, though James Silva, PACAF deputy director of logistics, said some of the MRAPs will become operational at specific locations, such as in South Korea and Japan. Silva said PACAF is "being very selective" about which vehicles are "turned into daily use items versus wartime support."

However, Liu said AFCEC is not even taking the MRAP distribution plan into account. "We're just trying to make the technology work and when we get the requirements, then we'll figure out where the MRAPs will come from," he said.

The Air Force is pre-positioning materiel throughout the Pacific so it can operate from many different locations if a crisis or contingency arises, said officials.

"One of the things we know from … studies … [is that we] need to operate out of more locations than just main operating bases," said Silva. "So where do we want to put our stuff? We know wherever we put it, it's going to be the wrong place, but we're picking key locations to place stuff."

TRADING REPAIRMEN

For example, the command wants to put "key ground equipment," such as tugs and towbars, at RAAF Darwin or RAAF Tindal in Australia to handle B-52s when they fly in as part of PACAF's continuous bomber presence, operated out of Andersen.

Increased bomber rotations would require some infrastructure improvements at Australian bases. Basham said those discussions are ongoing right now.

"From an Air Force standpoint, … there is always a requirement for a little bit more concrete to park on and then the appropriate amount of fuel," said Basham, who commented that the "discussions with Australia are going great."

Silva said PACAF is considering acquisition cross-serving agreements with Australia, specifically on the aircraft maintenance side. If approved, the agreements would allow maintainers from either country to work on C-17s and eventually F-35s. He said the command is thinking about a similar agreement for C-130s because Australia flies a Herc variant.

"We haven't stepped in to certifying technicians yet to do the repairs because their training processes are different from ours, but we're going to study it to figure out what it would take" for Australians to do repairs on our airplanes and for us to do repairs on theirs, he said.

He estimated it would be 2017 to 2019 before something like that could be exercised.

PACAF has pre-positioned humanitarian assistance and disaster relief equipment, such as pallets, nets, forklifts, and aerial port materiel, in the Philippines.

"We have a contract to sustain the materiel and we can, if needed, loan it to the Philippines and they would take ownership of it," said Silva. "We're looking at other locations to go do that. It's a big bill to go placing more and more stuff out there, though we do have the capability to containerize stuff so we can keep it under lock and key and just go check [on] it every once in a while."

Unlike some other theaters, however, PACAF's logistics network is complicated by the "tyranny of distance." That's why bilateral and multilateral exercises are so important, stated Silva.

"You really can't go to your neighbor you've never met and ask them to watch your dog. You can only do that if you have a relationship with them," he said.

In Fiscal 2013 the command participated in 17 bilateral, two trilateral, and eight multilateral exercises or engagements. In Fiscal 2014, those numbers rose to 22 bilateral, three trilateral, and 11 multilateral exercises or engagements. The numbers appear to be holding relatively steady in Fiscal 2015, according to PACAF officials.



USAF photo by SSgt. Shawn Nickel

PACAF Commander Gen. Lori Robinson geets TSgt. Ian Neske at Eielson AFB, Alaska, in December. Alaska-based F-22s, as part of Rapid Raptor, can get out the door and start flying sorties within 24 hours.

Such exercises assure partners and allies in the Pacific that the US is committed to the security of the region, and they prevent any gaps that a potential adversary could step into, said Basham.

McDaniels said flex basing serves as a good deterrent because forces can operate from more than just the main bases in the Pacific. That not only keeps adversaries guessing where US forces and equipment are coming from, it helps the US build relationships with smaller island nations, enabling smoother integration if a humanitarian crises or contingency arises.



USAF photo by A1C Amanda Morris

TSgt. Howard Uyeda, an avionics technician, boots up a computer to connect to the F-22 Raptor behind him at Andersen.

Vietnam is one potential growth area, said McDaniels, who noted that in the future USAF could fly C-17s, C-130s, or tankers from there for military exercises or engagements.

"The last time we were really on the ground there as a military, it was a war. It's hard to believe it's come full circle, but that's a testament to the US focus on the region," said McDaniels. "I'm not saying it's been approved, or even that we're really working toward it, but if at some point we wanted to do military exercises just to train their military, we have the capability and resources available."

Lt. Col. Justin Spears, commander of the 19th Fighter Squadron, said there are many places other than the main operating bases, where the US could land aircraft if necessary.

"We need to figure out as an Air Force how to operate out of any location that's feasible and operationally capable for us to operate out of in the theater," he said during an *Air Force Magazine* visit to the 15th Wing in Hawaii.

That's part of what the Rapid Raptor concept is trying to address. Instead of the traditional 72- to 94-hour time period it takes to generate orders for a unit to deploy, under Rapid Raptor, Hawaii- and Alaska-based F-22s can get out the door and start flying sorties within 24 hours.

Although the concept is not fully operational yet, Spears said the Raptor airmen have already demonstrated they are able to compress the deployment time line. USAF is still working on the logistics required to set up camp and fly out of more austere locations.

That takes a lot of "forethought into what you're going to take with you," he said. "We almost need to have a plan and have a book for every place we could get tasked to go, then we just take the book and say we need X amount of supplies … based on said location."

Basham acknowledged it's impossible to know where the next contingency will arise, but said that's why pre-positioned equipment and the ability to operate from as many locations as possible in the Pacific are so important.

"We can't just feel comfortable with the way we operate today," he said. "We have to look for more opportunities to operate in more advanced fashions." ✪

UNDER CONTROL

By Tobias Burns and Matt Schehl

As SrA. Dustin H. Temple fired back at insurgents who had surrounded his unit in a remote area of Helmand province, Afghanistan, his team's interpreter heard some terrifying chatter came in over enemy radio.

The enemy was moving in to take the Americans alive.

So definitive was the Taliban advantage during the Sept. 27-29, 2014, action, insurgents on the rooftops didn't bother to take cover from the gunships, fighter aircraft, and attack helicopters that fired on them from above.

"They were braver than any insurgents we have ever fought," SrA. Goodie J. Goodman said in a recent meeting with reporters. Across the battlefield from Temple during the fight, Goodman's vantage point allowed him to see how grave the American position was.

"I'd never heard that before … about taking hostages," Goodman's battlefield companion, TSgt. Matthew J. Greiner, agreed. "I'd never heard talk so alarming."

It was probably for the best that the detachment of American Army Special Forces and Afghan commandos, whom the three Air Force combat controllers were there to protect, couldn't fully appreciate the peril of their situation.

The battle had begun more typically. In the early morning darkness on Sept. 28, the Americans and Afghan commandos moved into the small village in Kajaki district of northern Helmand province.

Already the combat controllers had called in several strikes from AH-64 Apache helicopters and A-10 Warthogs to kill six armed insurgents moving on their position. The enemy knew the Americans and Afghan forces were there.

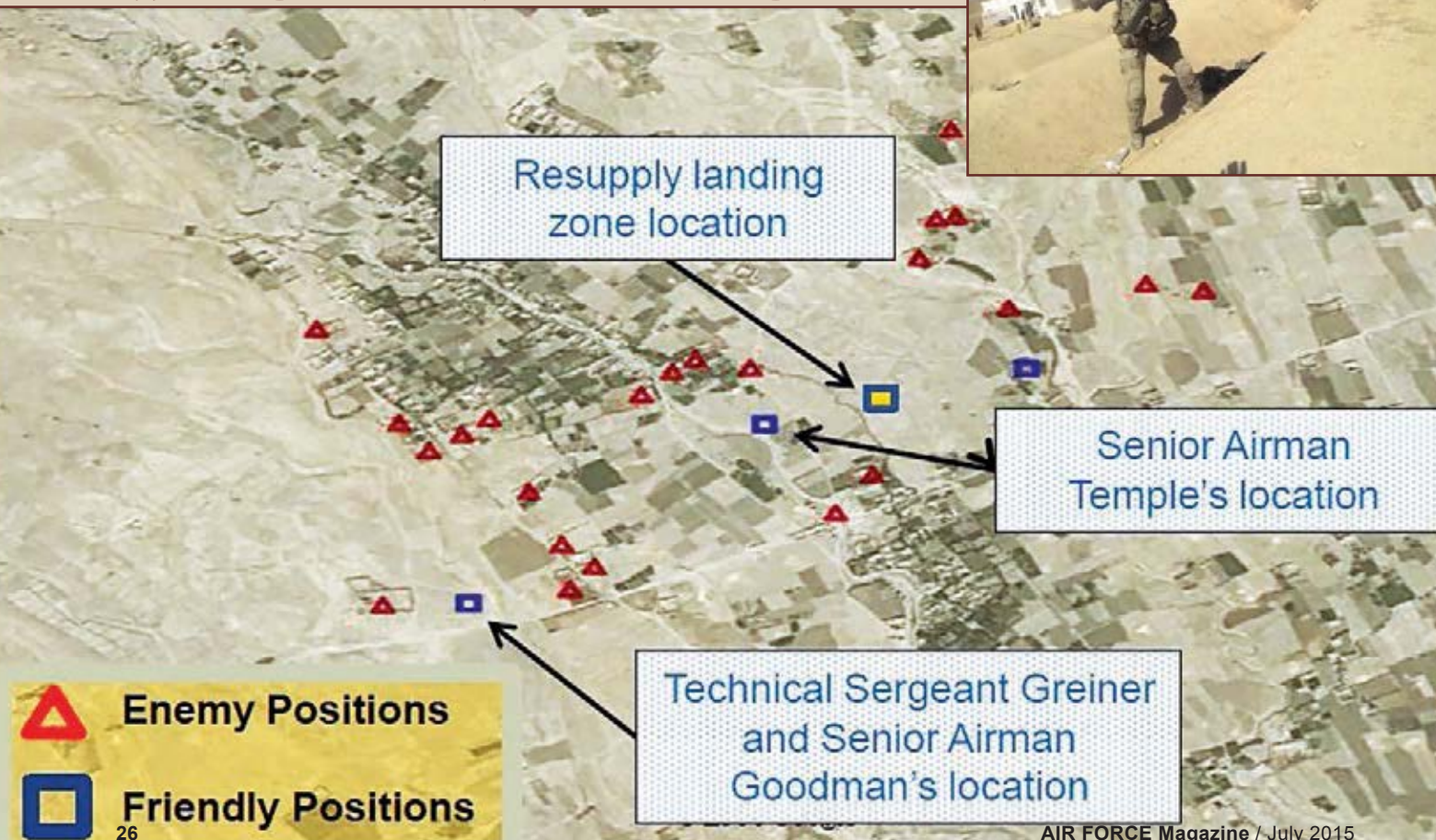
From intelligence, the airmen also knew the village bazaar was a nexus of enemy activity. Weapons, equipment, and drugs all moved through Kajaki to various Taliban safe havens throughout Helmand.

If the Americans and Afghans could clear the bazaar, they would deal a critical blow to insurgent operations in the region.

EIGHT-TO-ONE

The Special Forces established three defensive positions in the center, east, and west of the bazaar, while small teams, including the airmen, fanned out to search the market.





They came across a stockpile of ammunition and narcotics. They quickly destroyed these in place and made their way back to prepare defensive positions: Goodman and Greiner to the west and Temple to the center.

As daylight spread across the valley, the enemy began to step up its activity against the Americans and Afghan commandos, probing their positions and peppering them with small-arms fire.

The airmen punched holes through the thick mud walls of the buildings they were in to get a better look at the enemy while protecting their bodies from sniper fire.

Air Force maps of the battlefield, denoting coalition forces with little rectangles and insurgents with triangles, later demonstrated the overwhelming supremacy of the Taliban position. Triangles outnumber rectangles almost eight-to-one.

As the airmen pondered their situation, considering what manner of air strike would best counter their enemy's intentions, they were dealt an even more devastating blow. Sgt. 1st Class Andrew T. Weathers, a Green Beret and Special Forces medic, had taken a sniper round to the head.

For the actions that followed, Temple would receive the Air Force Cross, the highest award the Air Force can give, presented for extraordinary heroism in battle. Only six Air Force Crosses have been awarded since the attacks of Sept. 11, 2001, and it is the top award for gallantry in combat, short of the Medal of Honor.

Goodman and Greiner earned Silver Stars for gallantry in action against an enemy of the United States.

"Around 0800, we started getting a lot of traffic over the radios that the insurgents knew where our positions were," Goodman related, recalling the battle. "They knew we went through the bazaar."

Once that happened, the insurgents picked up the attack, firing machine guns and rocket-propelled grenades.

The Americans and Afghans returned fire to suppress the enemy. Goodman took up a position on a rooftop, lobbing round after round of 40 mm grenades.

At a little after 9 a.m., a chilling message came through the radio. Man down. Weathers had been felled by a sniper while firing from a rooftop.

Dustin Temple earned an Air Force Cross for his heroism while outnumbered and surrounded by Taliban fighters.





Above: A sequence of screenshots from a video taken with a helmet-mounted camera during the battle show a Special Forces soldier firing an 84 mm man-portable anti-tank recoilless rifle at enemy positions. Left: TSgt. Matthew Greiner and Army troops during the battle. Far left: A map of the battlefield shows that both positions were virtually surrounded by the enemy, many just 100 feet away. Despite the danger-close distance, Greiner called in the air strikes.



An Air Force Cross and Silver Stars

On May 6, the airplane hangar on Pope Field, Fort Bragg, N.C., brimmed with troops and overjoyed family members. Usually a storage and maintenance facility for military aircraft, it housed nothing but positive emotions on this day.

The actions of SrA. Dustin A. Temple, SrA. Goodie J. Goodman, and TSgt. Matthew J. Greiner during the 48-hour battle in Helmand province resulted in 60 dead insurgents, 250 pounds of confiscated narcotics, and the destruction of a major Taliban stronghold. The location had served as the nerve center for terrorist operations throughout Helmand.

But simply accomplishing a difficult mission was not why they received the lofty awards.

Army Capt. Evan Lacenski, commander of the coalition forces that day, credits the three men unequivocally with saving the lives of the men in the unit.

"Eleven members of ODA 7221 owe their lives to you," he told the men, in front of the crowd. "We will never forget what you did."

At the lectern, Vice Adm. Sean A. Pybus, deputy commander of US Special Operations Command, drew on his own experience as a Navy SEAL. Pybus stressed the "personal relationship" that develops between combat controllers, who call in air strikes, and the troops who rely on them for successful—and survivable—operations on the ground.

Combat controllers have a unique niche on the battlefield, attested by the fact that it takes longer to train one of them than for almost any other position in the military.

Their trademark red berets signify the dual function of elite battlefield airman and air combat expert. Not only do combat controllers fight the enemy themselves, they also tell a variety of friendly aircraft what to do, from ordering a strafing run to sending satellite coordinates for a Joint Direct Attack Munition strike to picking up injured comrades.

"It's tremendous, the achievement of these three youngsters," Pybus said. "Tremendous."

Lt. Gen. Bradley A. Heithold, commander of Air Force Special Operations Command, bestowed the honors that everyone had gathered in the hangar to see.

Lacenski described to the crowd at Fort Bragg how the airmen saved his life. He placed special emphasis on the words "with disregard for their own lives."

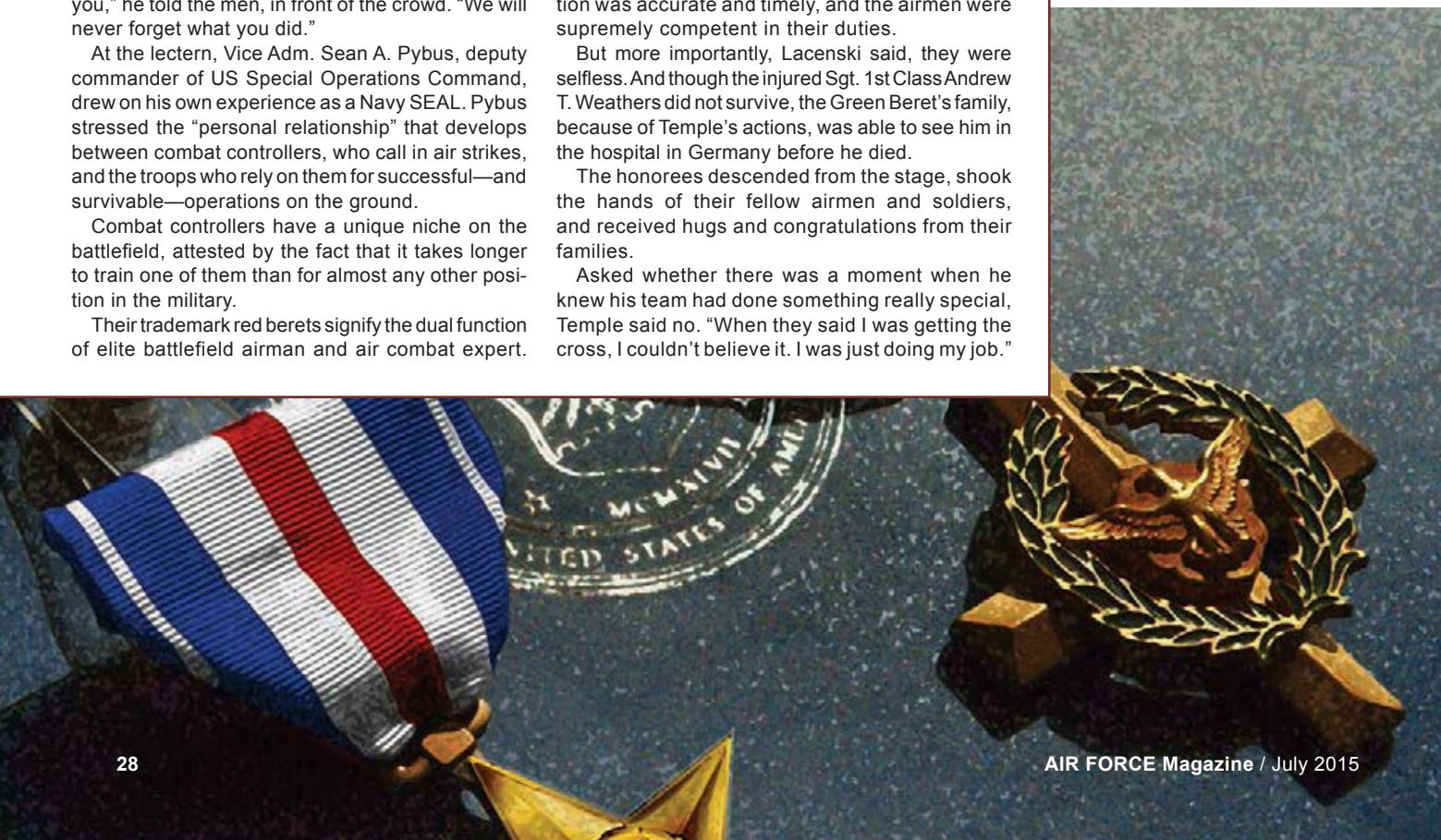
What stood out to Lacenski is that Temple, Greiner, and Goodman were so physically close to the strikes they saw fit to carry out. The coordination was accurate and timely, and the airmen were supremely competent in their duties.

But more importantly, Lacenski said, they were selfless. And though the injured Sgt. 1st Class Andrew T. Weathers did not survive, the Green Beret's family, because of Temple's actions, was able to see him in the hospital in Germany before he died.

The honorees descended from the stage, shook the hands of their fellow airmen and soldiers, and received hugs and congratulations from their families.

Asked whether there was a moment when he knew his team had done something really special, Temple said no. "When they said I was getting the cross, I couldn't believe it. I was just doing my job."

Above: Lt. Gen. Bradley Heithold, commander of Air Force Special Operations Command (far left), and Vice Adm. Sean Pybus, deputy commander of US Special Operations Command, applaud SrA. Goodie Goodman, TSgt. Matthew Greiner, and SrA. Dustin Temple (l-r) at their medal ceremony.



"I immediately ran from my position to receive Weathers from the rooftop," Temple recalled. The injured man was still breathing but unconscious.

"I helped lower him down to the ground and moved him to a safer location," Temple said. "While teammates assisted in first aid, I called in a medevac over the satellite radio."

According to his Air Force Cross citation, when the helicopter arrived 45 minutes later, Temple carried Weathers across more than 300 feet of open terrain under direct enemy fire to an improvised helicopter landing zone.

Despite Temple's heroic efforts to save him, Weathers died at the US military's Landstuhl Regional Medical Center in Germany a few days later. He was the only American fatality of the battle.

"I [feel] a great deal of remorse for Sergeant Weathers. He was an awesome man," Goodman said later.

Around noon, the detachment was beginning to run low on ammunition. It fell to Temple to call in an emergency resupply, which came in by helicopter about an hour later through a cloud of small-arms fire.

SMACKED IN THE FACE

But when Temple, Greiner, and a few of the Afghan commandos ran out to receive the shipment, they were met with a surprise.

The ammunition was still packed in a forklift pallet, much too massive for an individual, or even a team of individuals, to lift.

Despite the size of the delivery, Temple and Sgt. Hollis Webb still tried to carry the pallet back to safety, but it immediately toppled to the ground.

With enemy fire landing all around them, they decided to run back to cover, regroup, and make another go for it later.

Right: Temple received the Air Force Cross for carrying a grievously wounded soldier across open terrain, under enemy fire to a helicopter landing zone. Below: Goodman on patrol in Afghanistan.



Temple didn't understand what the miscommunication had been.

"It was a strange resupply," he said. "Normally it comes in a bag, and it would be something you could carry, but this was a different type of aircraft bringing it in."

While their much-needed ammunition lay in plain sight on contested ground, they established a plan to go in with more men, set up a suppressing fire line, and grab as much of it as they could.

On their second attempt, Temple, Greiner, two other Americans, and six Afghans were able to bring almost all of the ammunition back to the compound they were using for cover.

It wasn't until they were back inside that they realized how risky their maneuver had been.

"The fire was pretty effective," Temple admitted. "One of our friendlies said, 'Hey, are you guys OK? You're taking fire all around your feet!' But no one received any injuries."

The relief of being resupplied didn't last long. Radio traffic indicated that insurgents were going to make another major push on the coalition troops, force a surrender, and try once again to take them alive.

"That's when I had the aircraft overhead start doing a defensive scan around our forward positions looking for insurgents close to us," Greiner said.

It turned out the insurgents were barely 100 feet away. For the purposes of an air strike, such a distance is danger-close and tantamount to being in the same location.

Nonetheless, Greiner called in the strike.

"I had a few-second conversation over the radio making sure it wasn't our guys that were outside of the building, and we confirmed it. Then we went ahead and launched multiple Hellfires off the rail."

The blasts were so big that coalition forces were "smacked in the face" with dust through fighting holes they had dug in the walls, according to Temple.

"We did everything we could to push them back from us—everything short of putting our birds at risk. We had to avoid making another 'Black Hawk Down' scene," Goodman said, referencing the 2001 film based on real-life events in 1993, when an Army Rangers helicopter was shot down in Mogadishu, Somalia.

It worked. The combat controllers coordinated the air attacks and ammunition drops from their positions on the ground effectively enough to repel the enemy onslaught and win the battle. ✪



Tobias Burns has written for US News and World Report, Market Watch, *and the* Chicago Sun-Times *and studies business journalism at Northwestern University's Medill School of Journalism. Matt Schehl, a former Army NCO and DOD cultural advisor, is a graduate student at the Medill School. This is their first article for* Air Force Magazine.

Their FINEST Hour

By John T. Correll



An RAF Spitfire chases a Luftwaffe Bf 109 during a dogfight in the Battle of Britain, in this painting by Ivan Berryman.

The Battle of Britain, which began 75 years ago this month, was the single most important engagement of World War II. If the British had lost, the consequences would have been catastrophic.

■ At best, Britain would have had to seek a peace settlement with Germany on Hitler's terms, which would have been severe. Winston Churchill would most likely have been replaced as Prime Minister by the Foreign Secretary, Lord Halifax, or former Prime Minister David Lloyd George. Both of them thought negotiation with Germany was inevitable.

■ Germany would have consolidated its domination of Europe. Had Britain been unable to continue the fight, the United States would not likely have entered the European war. Even if it did, there would have been no bases in Britain from which to conduct a bombing offensive against Germany or launch a D-Day invasion of Europe.

■ Without an Atlantic front siphoning off forces and resources, Germany may—or may not—have been able to defeat the Soviet Union. Conversely, if the Soviets defeated Germany, there would be nothing to impede their march further west. Hitler

From an original painting by Ivan Berryman, courtesy of Cranston Fine Arts



The British were expected to lose the Battle of Britain. Fortunately, Winston Churchill and the RAF thought otherwise.

might well have won World War II—and if he did not, Stalin would have.

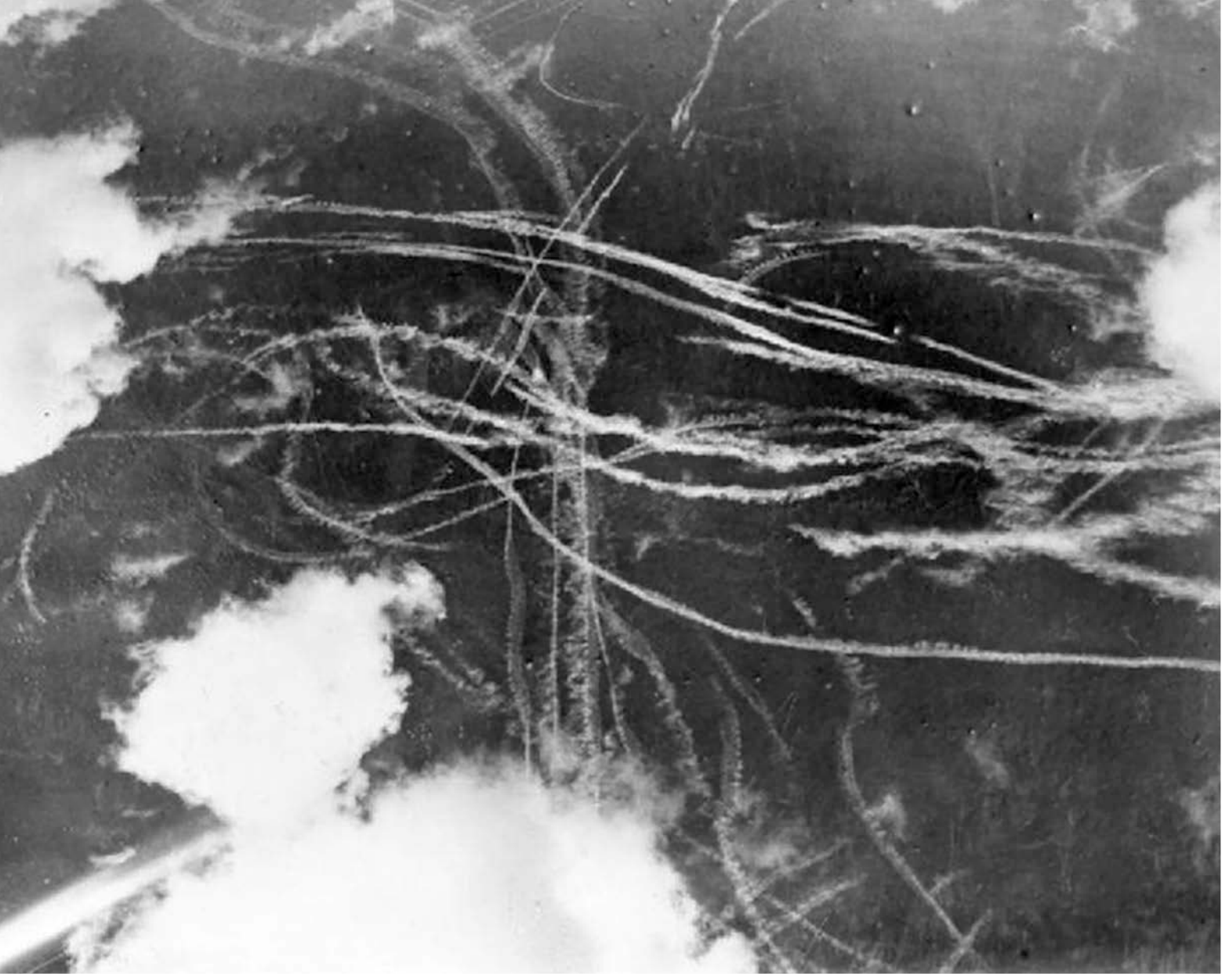
When the Battle of Britain began in July 1940, the British were not expected to win. That they did win was primarily attributable to the strength and character of Winston Churchill and the Royal Air Force—and to critical mistakes by Hitler and the Luftwaffe.

BRITAIN STOOD ALONE

In the summer of 1940, Britain's situation was grim. In less than two months, Germany had conquered most of western Europe from Norway to the Pyrenees. The fast-moving German army, supported by panzers and Stuka dive bombers, overwhelmed the Netherlands and Belgium in a matter of days. France surrendered on June 22. Britain was fortunate to extract its retreating expeditionary forces from the beaches at Dunkirk.

The United States was not yet in the war, nor was Russia. Only seven percent of Americans were willing to go to war on the side of the British. The Molotov-Ribbentrop nonaggression pact of 1939 was still in effect, not broken until Germany invaded the Soviet Union in June 1941. Except for the support of its own dominions and empire, Britain stood alone.

Churchill, 65, had served in Parliament and various Cabinet positions for 40 years. He was First Lord of the Admiralty at the beginning of World War I and again in 1939. In time, he would be recognized as one of Britain's greatest leaders, but that was still to come. In May 1940, the Conservative Party turned to him—in desperation and with considerable reluctance—to replace the hapless Neville Chamberlain as Prime Minister. Many of his colleagues and much of the ruling class disliked Churchill and distrusted







him as reckless, belligerent, and drawn to adventure and romanticism.

Appeasement and defeatism were strong in the British Foreign Office. After Dunkirk, the Foreign Secretary, Lord Halifax, believed that Britain had lost. He inquired through Italian intermediaries what Hitler's terms for peace with Britain would be. David Lloyd George, Prime Minister from 1916 to 1922, also believed it was futile to fight.

Clockwise from top: Contrails left by British and German aircraft after a dogfight during the Battle of Britain. Air Chief Marshal Hugh Dowding. The leader of Fighter Command was brilliant and capable but cold and aloof. His detractors worked constantly to oust him from command. Prime Minister Winston Churchill flashes the iconic "V" for victory sign. Surrounded by defeatists and appeasers, Churchill convinced the British to stand resolutely against the threat of a German invasion.



A Hurricane circles overhead as a Heinkel He 111 sinks into the water near the British islands of Scilly in this painting by Berryman.

From an original painting by Ivan Berryman, courtesy of Cranston Fine Arts

US Ambassador Joseph P. Kennedy was convinced that the Germans would win the impending Battle of Britain. So was American aviator Charles A. Lindbergh, who had toured Germany as a guest of the Luftwaffe.

Gen. Maxime Weygand, commander of the defeated French forces, predicted that "in three weeks, England will have her neck wrung like a chicken."

Churchill, undaunted, vowed that "we will never surrender" as he rallied the nation with a ringing call to arms: "Let us, therefore, brace ourselves to our duty and so bear ourselves that, if the British Empire and its Commonwealth last for a thousand years, men will still say, 'This was their finest hour.'"

THE DOWDING SYSTEM

A German invasion of Great Britain was contingent on air superiority. Otherwise, the invasion fleet would be destroyed in the English Channel and on the beaches. Thus the British were in the unanticipated position of relying on RAF Fighter Command as their first line of defense.

The Royal Navy, the traditional strength of the island nation, still ranked first among the armed forces. The RAF had been a separate service since 1918, created in response to the relentless bombing of Britain by German Zeppelins in World War I. However, its founding father, Marshal of the RAF Hugh M. Trenchard, built the force around long-range strategic bombardment. Like many airmen of his day—including Billy Mitchell in the United States—Trenchard believed that the bomber was the primary instrument of airpower.

This conviction was reflected in national policy. In 1932, Stanley Baldwin—who was Prime Minister three times between the world wars—famously declared that "the bomber will always get through." There was no defense against air attack, Baldwin said. "The only defense is in offense."

Fighter Command, organized in 1936, was regarded by almost everyone, including the Air Ministry, as secondary in importance to Bomber Command. From its beginning, Fighter Command was led by Air Chief Marshal Hugh Dowding, an outstanding but eccentric officer known as "Stuffy" for his cold personality. He was stubborn and aloof, and he had no ability to charm his fellow air marshals or the politicians. Some young airmen saw him as too old, lacking in spirit, and too long away from active flying.

Of greater consequence, "Dowding was perhaps the one man of consequence in the United Kingdom—perhaps in the entire world—who did not believe that the bomber would 'always get through,'" said historian Michael Korda.

Fighter Command, under the "Dowding System," formed a strong defensive screen, supported by radar stations along



Data from British radar sites were fed to the Fighter Command operations room at Bentley Priory where members of the Women's Auxiliary Air Force with croupiers' rakes moved aircraft symbols on a huge table map to track RAF and enemy aircraft.

the coast that could detect German aircraft as soon as they took off from bases on the continent. Information from the radar sites fed into Dowding's command and control nerve center at Bentley Priory on the outskirts of London. From there, fighter squadrons could be scrambled and directed with great economy of force.

The Air Ministry and the RAF had been pressing Dowding to retire, but at Churchill's insistence kept him on during the emergency because of his unique knowledge of the air defense system.

Dowding believed in careful conservation of his outnumbered force, employing only as many fighters as he absolutely had to and preserving the rest for later need. In May 1940, he clashed with Churchill, who wanted to send more RAF fighters to the battle in France, which was nearing its end and in which hundreds of British aircraft had been lost already.

Dowding was mainly successful in limiting further deployments, but as the British fell back from Dunkirk, Fighter Command was seriously weakened. If the German offensive came at that moment, Dowding told the War Cabinet June 3, he could not guarantee air superiority for more than 48 hours.

THE LULL

Several of Hitler's generals urged him to move immediately against Britain to exploit the stunning victory in France but he was not ready to do so. The Germans had taken substantial casualties—including almost 1,500 airplanes—and needed time to recover. In addition, Hitler was persuaded by the speculation that Churchill would be ousted and the new government led by Halifax or Lloyd George.

Meanwhile, the Luftwaffe moved into position for the attack, deploying air fleets to northern France and Belgium, backed up by a third one in Norway. The Luftwaffe was the largest and best air force in Europe, about twice the size of the RAF. Many of its pilots had been seasoned in combat in the Spanish civil war.

The Luftwaffe was led by Reichsmarschall Hermann Goering, once a dashing World War I ace who succeeded the "Red Baron," Manfred von Richtofen, in command of the Flying Circus, but who was now a swaggering, bloated caricature of himself. Goering and the Luftwaffe boasted that it would take four days to defeat Fighter Command in southern England and four weeks to finish off the RAF and the British aircraft industry.

The Germans were about to enter a fight for which they were not organized or equipped. Their successes thus far were gained in short, fast blitzkrieg ("lightning war") assaults in which tanks and Stuka dive bombers opened the way for the infantry. In Britain, the tanks and the ground forces would not be there, and the Stukas would be starkly vulnerable to an active air defense.

The Luftwaffe would have to do the job alone. The fighter force was strong, with the Messerschmitt Bf 109 generally acknowledged to be the best fighter in the world. However, the 109's range was limited. Flying from bases in France, it had had only about 10 minutes of combat endurance over London. The rest of the Luftwaffe was overloaded with dive bombers. There were no long-range bombers and the twin-engine medium bombers, the Junkers 88, Heinkel 111, and Dornier 17, were poorly suited for strategic bombardment.

The RAF used the lull to full advantage. Between June 29 and Aug. 2, the British produced 322 new Hurricane and Spitfire fighters, more than replacing those lost in France and offsetting losses in early engagements in July.

On June 19, Fighter Command had only 520 aircraft ready for operations. By Aug. 9, there were 715, with another 424 in storage and available within a day.

Fighter Command would fight the battle primarily with its two best aircraft, the Supermarine Spitfire and the Hawker Hurricane. The sleek Spitfire was the equal of the Bf 109 in most regimes of combat, and the workhorse Hurricane was almost as good and could hold its own in the fight.

Dowding organized the Fighter Command defense into four groups. The largest, covering southeastern England and the approaches to London, was 11 Group, commanded by Air Vice Marshal Keith R. Park, a New Zealander and a fighter ace from World War I. To the immediate north was 12 Group, covering the Midlands and East Anglia, commanded by Air Vice Marshal Trafford Leigh-Mallory. The other two groups had lesser roles in southwestern and northern England and in Scotland.

The RAF had several important force multipliers:

■ Britain had cracked the high-level German "Enigma" code and made good use of the intelligence product, called "Ultra," derived from intercepts.

■ At the outbreak of war, both the Luftwaffe and the RAF used 87 octane aviation fuel. In March 1940, the RAF converted to 100 octane fuel, obtained from the United States. This gave a 30 percent boost in performance to the Rolls Royce Merlin engines in the Spitfires and Hurricanes. The Luftwaffe continued to use 87 octane.

■ The Germans had radar before the British did but never used it to full advantage, nor did they understand how pervasively the British had integrated it for air defense and command and control.

THE CRITICAL MATCHUP

The Battle of Britain unfolded gradually, beginning with German attacks in July on shipping in the English Channel, intended mainly as bait to lure the RAF fighters. Dowding was reluctant to respond to the provocation with his scarce fighter resources, but Churchill was not about to concede the Channel to the enemy.

On the morning of July 10, German bombers and fighters pounced on a British ship convoy off the coast of Kent, near the Strait of Dover. Spitfires scrambled and shot down some of the Germans. By afternoon, more than 100 aircraft had been drawn into the action. The Luftwaffe lost 13, the RAF six. The British observe July 10 as the first day of the Battle of Britain.

Hitler gave the order on July 16 for the invasion, dubbed Operation Sea Lion, and Goering assured him that the RAF would be destroyed in time for it to begin by the target date of Sept. 15. He set Aug. 13 as "Eagle Day," on which the Luftwaffe would open the all-out assault to "wipe the British air force from the sky" and clear the way for Sea Lion.

The order of battle is difficult to quantify precisely. The numbers changed constantly as a result of losses and replacements. Figures vary according to which units are counted and how many aircraft are estimated to be in commission.

Some aircraft—the German dive bombers and the British Defiant and Blenheim fighters—were of little value. RAF Bomber Command's involvement was in strikes on the continent. In August 1940, the critical matchup over Great Britain was some 1,000 German bombers and 800 Bf 109s against about 750 British Spitfires and Hurricane fighters.

Ahead of Eagle Day, the Luftwaffe attacked RAF forward airfields and radar stations but the effort was largely wasted. They tried to bomb the radar towers, which were hard to hit and easy to replace, rather than the vulnerable radar site buildings where the trained operators were located.

Bad weather took the edge off Eagle Day on Aug. 13 but the Luftwaffe struck with full fury on Aug. 15, launching more than 2,000 sorties, the most of any day in the Battle of Britain. The Germans claimed to have destroyed 99 RAF aircraft in the air. In actuality, the RAF lost 34 (two of them on the ground) compared to 75 lost by the Luftwaffe.

Late August brought the "desperate days" when, according to Churchill, "the scales had tilted against Fighter Command." On average, the Luftwaffe sent 1,000 airplanes a day. Some RAF pilots scrambled six times a day. Overall aircraft losses between Aug. 24 and Sept. 6 were worse for the Germans (308 vs. 273 for the RAF), but more of the British losses were in fighters. Production of Hurricanes and Spitfires fell behind the replacement rate.

THE RAF HANGS ON

Information from the radar sites converged at Dowding's headquarters at Bentley Priory, where the ballroom had been converted into a huge command and control center. The battle staff stations were on balconies overlooking a plotting room where Women's Auxiliary Air Force members with headphones used croupiers' rakes to move blocks representing RAF and enemy aircraft on a large table map of the English coast and the Channel.

"Each of our movements was projected almost faultlessly on the screens in the British fighter control centers, and as a result, Fighter Command was able to direct their forces to the more favorable position at the most propitious time."

"Our planes were already detected over the Pas de Calais while they were still assembling and were never allowed to escape the radar eye," said Luftwaffe ace Adolf Galland. "Each of our movements was projected almost faultlessly on the screens in the British fighter control centers, and as a result, Fighter Command was able to direct their forces to the more favorable position at the most propitious time."

The brunt of the attack fell on 11 Group in the south, where the exceptionally capable Park understood Dowding's system and executed it flawlessly. Dowding did not want to expend his limited resources in big fighter battles. His strategy was to concentrate on the German bombers, which did the real damage. Fighter Command engaged the Bf 109s escorting bomber formations but refused to be drawn into combat by Luftwaffe fighter sweeps. The primary objective was to keep the bombers from reaching their targets.

This put Dowding at odds with Air Vice Marshal William Sholto Douglas, deputy chief of the Air Staff, who believed the important thing was to shoot down as many enemy aircraft as possible. "It is immaterial in the long run whether the







bomber is shot down before or after he has dropped his bombs," Douglas said.

Park's tactic was to employ his fighters as small units, no larger than squadron size, hitting the bomber formation again and again. The squadrons could launch and strike quickly, attack in a target-rich environment, and get away fast without risk of a major defeat.

Dowding and Park did not comprehend the dissatisfaction that was brewing against them in 12 Group to the north, where the ambitious Leigh-Mallory was in command. Park, who was junior to Leigh-Mallory but had more experience in fighters, had been chosen for the more important command of 11 Group.

"Leigh-Mallory, for his part, resented the fact that the action and most of the glamour and awards were going to No. 11 Group, and he had come to the conclusion that Dowding's tactics (and Park's strict adherence to them) were in any case completely wrong," said historian Korda.

Leigh-Mallory made no secret of his desire to see Dowding removed from command.

Egged on by one of his energetic squadron commanders, Douglas Bader, Leigh-Mallory became the advocate for the "Big Wing" concept, attacking the enemy with large RAF fighter formations of three to five squadrons led by a single commander. In Park's opinion, it would take the Big Wing too long to form up and it would arrive too late to make a difference. Nevertheless, the concept had support from Dowding's detractors at RAF headquarters and in the Air Ministry.

Had Dowding and Park made a greater effort to get along with their colleagues despite the disagreements, they might have lessened the troubles that lay ahead, but diplomacy was not their style.

The Germans were running out of time. They could not launch their Sea Lion invasion until the RAF was neutralized and the Luftwaffe had not been able to get it done. After the weather turned in late autumn, a seaborne invasion would no longer be possible.

> "It is immaterial in the long run whether the bomber is shot down before or after he has dropped his bombs,"

HITLER'S BIG MISTAKE

As September began, the bombing was focused on British airfields and aircraft factories. At that point, the Germans doomed any chance of success with a change in strategy, brought on by a combination of mistakes in understanding and judgment.

On the night of Aug. 24, a Luftwaffe crew, off course in the dark, dropped its bombs on London. It was an error in navigation. The target had been oil storage facilities to the east of the city, but Churchill did not know that. He ordered reprisal strikes on Berlin, which RAF Bomber Command carried out the next night.

Hitler, who had not been told about the original mistake by the Luftwaffe, was outraged and changed the primary targeting for German bombers to London and major British cities. The order went into effect Sept. 7.

At least one Luftwaffe leader, Field Marshal Albert Kesselring, agreed with the change for his own reasons. On Aug. 25, Kesselring believed the RAF had only 200 fighters left. The bombing of London, Kesselring thought, would force the British to put their remaining fighters in the air, where they could be destroyed by superior German numbers. In fact, Dowding had 233 Spitfires and 416 Hurricanes, and the German strategy change had taken the pressure off the RAF at a critical time.

On Sept. 15—later celebrated as "Battle of Britain Day"—the Luftwaffe sent 400 bombers and 700 fighters against Britain. Park committed every fighter he had, and they shot down 56 of the German airplanes and damaged others so badly they could not make it home.

The RAF lost 28 airplanes.



L to r: Air Vice Marshal Keith Park, commander of 11 Group, which took the brunt of the Luftwaffe attack. He flawlessly executed the "Dowding System" for air defense. Squadron Commander Douglas Bader convinced Air Vice Marshal Trafford Leigh-Mallory of the advantages of the "Big Wing" formation. He went on to become one of the most famous fighter aces of World War II. Ambitious Leigh-Mallory was a ringleader of the anti-Dowding faction and eventually replaced Park at 11 Group. Air Vice Marshal William Sholto Douglas, deputy chief of the Air Staff, disliked and disagreed with Dowding and succeeded him as head of Fighter Command.

The Luftwaffe never again came in such strength. The fighting continued but the realization was setting in that the Germans had failed to destroy the RAF. On Sept. 17, Hitler postponed Operation Sea Lion until further notice. The British gained strength steadily. The Germans were unable to surge aircraft production and their fighter and bomber strength declined by more than a fourth between August and December.

Bader got several chances in September to lead Big Wing formations, with mixed results. On the main occasions, the participating squadrons took too long to form up and were late in arriving at the battle, just as Park had predicted.

The danger of invasion was gone. By British accounting, the Battle of Britain ended Oct. 31. However, not everyone understood the outcome yet. In an interview with the *Boston Globe* in November, US Ambassador Kennedy still believed the battle was lost and declared that "democracy is finished in England." He tried to deny the quote but the reporter had a witness and Kennedy submitted his resignation later in the month.

In December, Churchill recalled Weygand's prediction in June that England would have her neck wrung like a chicken.

"Some chicken," Churchill said. "Some neck."

The sustained bombing of British cities, called "the Blitz," continued through May 1941, killing 40,000 civilians and destroying a vast number of buildings for no strategic purpose. In December, Hitler ordered the armed forces to prepare for Operation Barbarossa, the invasion and destruction of the Soviet Union. In another of his overblown announcements, Goering promised that the Luftwaffe would shoot down the Red Air Force "like clay pigeons."

DOWDING DEPARTS

The men who had directed the RAF victory in the Battle of Britain did not last long once it was over. Sholto Douglas, Leigh-Mallory, and other critics had a new complaint: Dowding was not doing enough to stop the devastating nighttime bombing as the Blitz got underway.

Dowding said the answer was a night fighter aircraft. The Bristol Beaufighter was just coming into service and the ground control radar to support it was not yet perfected. Subsequent events would bear him out, but at the time, the criticism found considerable acceptance.

"Although Dowding was absolutely right, the notion that for the present, nothing could be done about a serious military problem was not one that Churchill would have accepted tamely from any senior officer," said historian Korda. "He was not about to tell the British people that they should wait quietly and patiently until Fighter Command eventually received the right equipment and revised its training procedures, while in the meantime their homes were being blown up or burned night after night."

On Nov. 25, Dowding got a telephone call from the secretary of state for air, Archibald Sinclair, telling him to relinquish his command within 24 hours. Dowding asked for a reason and was told only that the decision had been reached.

Later that day, Sholto Douglas replaced Dowding as head of Fighter Command. Leigh-Mallory took over 11 Group from Park, who was sent to Training Command.

It was probably time for Dowding to move on, but the handling of it reflected no credit on the Air Ministry or the RAF. Churchill acquiesced to the change, but understood that it was shabby treatment of the men who led the victory in the Battle of Britain. In 1943, Churchill proposed Dowding for a barony, which was approved. He accepted and chose the title Lord Dowding of Bentley Priory.

THE FEW

During the four months of the Battle of Britain, Fighter Command flew about 80,000 sorties. Often forgotten, Bomber Command flew 9,180 sorties and was enough of a threat to keep the Luftwaffe from sending as many aircraft across the Channel as it might have otherwise.

Both sides wildly overestimated the number of enemy airplanes they had shot down. The numbers were adjusted to more realistic levels after the war, but differences persist. A recent and credible estimate is that the British lost 1,547, including 770 Hurricanes and Spitfires and 376 bombers. The Luftwaffe lost 1,887, of which 650 were Bf 109s.

The RAF tended to use its Spitfires against German fighters and its Hurricanes against bombers, but the Hurricanes got their share of enemy fighters, too. Hurricane squadrons accounted for 55 percent of the total RAF victories, the Spitfire squadrons for 43 percent.

As Churchill said, "Never in the field of human conflict was so much owed by so many to so few," referring to the RAF, but much was owed to Churchill as well. He had no grasp of military strategy. Throughout World War II, he drove his generals and admirals to despair with his fondness for ideas that were bold and inspiring but impractical or unsound. However, he was rock solid on Napoleon's first principle of war, the objective.

He saw, when others did not, that the objective that mattered was the absolute determination to fight. By sheer force of his will, he carried the British nation along with him. Thus committed, the strategists and military leaders figured out how to get it done.

The first step—and an enormous one—was victory in the Battle of Britain. ✪

John T. Correll was editor in chief of Air Force Magazine *for 18 years and is now a contributor. His most recent article, "Gunships on the Trail" appeared in the June issue.*

Edwards Renaissance

By John A. Tirpak, Editorial Director

The home to many legendary aviation feats is gearing up for a new golden age of flight test.



Edwards AFB, Calif., is gearing up for a new golden age of flight test, the likes of which have not been seen in 40 years. Units at the storied base will soon be shaking out a new and varied generation of airplanes and weapons, while continuing to keep the rest of the Air Force inventory fresh by proving upgrades to hardware and software alike.

At the same time, Edwards is faced with new challenges. Technology is one, demanding a burgeoning capacity to capture, store, and manage data. Another is encroachment—not from housing developments edging up to the runway, but on the bandwidth needed for telemetry and air traffic. The march of wind-power farms toward the base imperils electronic warfare testing, and California's historic drought threatens the stability of the dry lakebeds—the huge natural runways—that brought the Air Force here in the first place. Base leaders say they must meet the challenges, though, because of the coming surge in activity.

"We're kind of in the beginning of another modernization age for the Air Force," said Brig. Gen. Carl E. Schaefer, 412th Test Wing commander, in an interview.

"Flight test is ticking up," he said, and Edwards is preparing for an influx of new modernization programs "we haven't had … since probably the late '70s, early '80s." During those years Edwards was heavily engaged testing the then-new F-15, F-16, KC-10, B-1, and A-10, along with E-3 AWACS—and a host of other sensor platforms and electronic warfare types such as the EF-111—and new missiles.

Now, the biggest effort at Edwards is the massive F-35 program—really three different aircraft for three armed services. Coming very soon will be the KC-46 tanker, and in the pipeline are the Long-Range Strike Bomber, the T-X trainer, and the JSTARS replacement.

Though its formal development program is over, the F-22 remains a strong presence at Edwards as the fighter undergoes refinements. Upgrades to the B-2 bomber are a constant activity—and for its B-1B and B-52 fleetmates as well. Almost every other aircraft type USAF flies is represented somewhere on the flight line.

"Everything in the Air Force still has an active test program," Schaefer said, "because there are always software drops that need to be tested [and] new weapons."

If there isn't a dedicated test asset for a particular type on the Edwards ramp, the owning major command will send a specimen for the test's duration. For example, "we don't have any KC-10s here, but we'll borrow a KC-10 from Travis [AFB, Calif.], … and we'll instrument it," Schaefer said.

Depending on the workload, Edwards will adjust its personnel, and in recent years, although it has been particularly busy with the F-22 and F-35, the 412th has undergone a series of consolidations and reorganization to be "as efficient as possible," said Vice Commander Col. David F. Radomski. At Edwards, the 412th Test Wing merged with the 95th Air Base Wing.



C-17s form up near Edwards AFB, Calif., for a practice precision airdrop of cargo. Although the pace of flight testing at Edwards peaks and ebbs, there is a steady level of effort for almost every system in the USAF inventory as new software, capabilities, weapons, and operational concepts are evaluated. A flurry of new systems will soon require an increase in test tempo.

Photo by Bobbi Zapka

The wing now has 7,700 airmen, supported heavily by contractors.

Edwards is a data factory, generating gigabytes by the hour. One building is dedicated to nothing but servers. "It's an enormous amount of data to collect and analyze," Schaefer noted.

The servers are all "sequestered"—separated from the grid—"because they're proprietary and based on classification," Schaefer explained. The technological challenge at Edwards in recent years, he reported, is "making sure we've got the right tools" to manage and understand the data.

"We've exceeded the human capacity to analyze all that data. We need some data tools to help us," he said. Some of the sensors used in flight test sample information at a rate of three million lines a second. That's 20 times faster than the state-of-the-art of 20 years ago.

One building at Edwards houses "mission control" rooms. Each can be manned by 50 or more people at dozens of workstations. These include test directors, a test coordinator—the person who actually talks to the pilot—range control and range safety officers, plus all the engineers looking to verify simulations and predictions of how their new technology will behave in practice. The terminals pipe in video, audio, and telemetry from a test flight—not very different from a NASA control room for space missions. These rooms put almost all the people involved with testing something—an airplane, missile, or software package—together, to facilitate cooperation and solve problems quickly.

MODELING AND SIMULATION

Rob Palmer, Edwards' 412th range operations director, said the control rooms are especially useful when a problem arises in a test. Quick conferences and analysis of the data can soon determine whether the problem demands an abort of the flight, or whether the sortie can be saved to carry out other required tests.

"That saves a lot of money," he said, since the biggest cost of flight testing is in the flying of airplanes, chase aircraft, tankers, and other support functions.

Despite the advent of ever-more-accurate modeling and simulation, historically these predictors of how technology will work in the real world are only "about 50 to 75 percent accurate," Schaefer said. "Contractors always bank on more than that," he added, but the accuracy of predictions has remained remarkably consistent.

The range at Edwards is impressively large, spanning hundreds of square miles, augmented by the proximity of the Navy's China Lake, NAS Fallon, and ocean ranges; the Army's Fort Irwin desert exercise arena; and the Utah Test and Training Range, the Mojave Desert, and the sprawling Tonopah/Nellis AFB, Nev., complex. Edwards has a number of distinct practice areas. One is a 225-mile-long "supersonic corridor," where jets can fly at supersonic speed above 30,000 feet. Bone-rattling sonic booms are a frequent if unsettling sound at the base. Other areas are typically reserved for live weapons releases—one

is known as the "barbell" or "dog bone" because of its distinctive shape as seen from above. Most overlap.

"We are working to improve the connectivity" of Edwards with the other facilities, Palmer said, with Edwards serving as a network hub for all the nearby locations, and others besides. Following the consolidation of Edwards and Eglin AFB, Fla., under Air Force Materiel Command's flight test "center," the two bases are building up their ability to conduct tests at a distance.

"We recently did an F-16 test where the control room at Eglin Air Force Base was controlling a flight test with an F-16 out here on the West Coast, and it was seamless," said Radomski. "The pilot couldn't tell if he was talking to someone 2,000 miles away, and vice versa. … So we are improving those types of connectivity for all the DOD ranges in order to prepare for these future systems." He said that "if we have the technology to test … we should really be agnostic about testing location." The F-16 experiment was akin to Predator remotely piloted aircraft being guided in combat half a world away from Creech AFB, Nev., where the "crews" are located, he said.

Range connectivity is essential, Schaefer said, to be able to test new systems such as the Long-Range Standoff missile, which will have such long legs that a mission can't be simulated within the confines of one or even two or three ranges, but will traverse many.

"You have to have a multirange approach," he said. The telemetry and connectivity upgrades are necessary for the test enterprise generally, but crucial for testing the coming generation of standoff weapons.

Schaefer, who has 15 years in the test business, said he's heartened by the attention and focus being paid to the test infrastructure by Chief of Staff Gen. Mark A. Welsh III and Air Force Secretary Deborah Lee James.

"I think both the Chief and the Secretary have realized that if we're going to modernize the Air Force and spend a lot

Staff photos by John A. Tirpak





Left: Bristling with antennas, this tower stands on a hill near the west entrance of Edwards. The various test programs generate prodigious amounts of data that must be collected and stored. USAF leaders have made a new priority of updating such test range capabilities. Below: An eclectic mix of aircraft reflects the diversity of types at Edwards. The base has—or can borrow—an example of almost every aircraft USAF flies.

of money, it behooves us to make sure the resources are available to test it," he said. "We haven't really looked at that in such a disciplined manner in my history with flight test." There's now a 10-, 20-, and 30-year flight test infrastructure roadmap that aligns with the introduction of new systems, he said. Improvements are needed in "telemetry, … computer system modernization, … range systems modernization," and in facilities. Some of them have not been renewed for many years, and it makes sense to improve buildings if they are going to house state-of-the-art gear.

"We have a backlog of things that need improvement," Schaefer reported. It's not about aesthetics, either. Schaefer said USAF must compete for the most talented scientists and engineers, and having an attractive, state-of-the-art facility is a big recruiting tool. Not having them can be a recruiting deterrent.

The in-house stable of test support aircraft—mostly F-16s and T-38s—are "all

Cracks in the Lakebed

ROGERS DRY LAKE, CALIF.—California's record-setting drought is imperiling the very things that brought the Air Force to the remote location where Edwards Air Force Base now sits: Rogers Dry Lake and Rosamond Dry Lake. The big, flat spaces were deemed ideal for testing aircraft as they offered, collectively, 60 miles of marked and maintainied runways. There was no need to "line up" on a runway, only to simply determine which way the wind was blowing and, as 412th Test Wing Commander Brig. Gen. Carl E. Schaefer said, "pick a place to land."

The site is used for a variety of test functions, including spin testing of aircraft. Many flying machines—such as the space shuttle—have made dead-stick landings on the surface.

There used to be a water table just 10 to 20 feet below the level of sprawling Rogers Dry Lake, according to David Sampson, runway manager for Edwards. Now, after years of prolonged drought, "there's a void there," and in some places, like Runway 33, the lakebed is collapsing.

Is this a threat to the continued utility of the runway complex on Rogers?

"It really is," Sampson said in an April interview. Before the voids, the lakebed would "kind of heal itself," as wind blew sand into fissures, and then, when rain came, the low spots would level themselves and later dry to a hard consistency "almost like poured concrete."

The surface of Rogers now, however, in some places is a series of irregular plates that Sampson likened to "curly potato chips"—still acceptable for runway work but not ideal. The big cracks, though, are a real danger to aircraft. At speed, an aircraft's wheels hitting such a hazard could be catastrophic.

For now, there are two approaches to coping with the problem. One is simply ruling some parts of the lakebed "off limits" to aircraft.

"There's a lot of room out here" for aircraft to land away from the cracks, Sampson said.

Three people at Edwards do regular lakebed inspections, and four more from the civil engineering shop maintain runways—both manmade and natural.

A remedial solution is to take lakebed material from "borrow pits" at the periphery, put it into a cement mixer, mix it with water, and "shoot that material into the crack … with what looks like a giant syringe," Sampson said. The process has yielded some success.

Rosamond, nearby, is in far better shape than Rogers, because a local water treatment company pours wastewater out onto the lakebed. Its surface is hard and flat as a result, Sampson said. There is unpredictability to the hazards, though. "Some fissures will open up … and close overnight," he pointed out.

Sampson said huge rains would be a problem; there could easily be large-scale collapses into the void. He's hoping for a steady series of light rains that would quench California's thirst, gradually refill the voids, and keep Rogers Dry Lake in good shape for many years to come.



Lt. Col Jeffrey Geraghty, then commander of the 412th Operational Support Squadron, and Edwards Air Force Base runway manager David Sampson assess cracks and cave-ins on Rogers Dry Lake. The prolonged California drought threatens Edwards' natural runways.





Staff photo by John A. Tirpak

Lockheed Martin photo by Tom Reynolds

Above: An F-22 takes off in the background as a two-seat F-16D chase plane taxies past a single-seat F-16. Right: Lt. Col. Jon Ohman, an F-35 test pilot, discusses tactical air control party ground testing with two marines from Marine Aviation Weapons and Tactics Squadron One. The F-35 Integrated Test Force includes pilots and aircraft from all three services that will use the fighter.

in good shape." Schaefer said he doesn't expect to need new ones anytime soon.

Nonprogram-specific technologies are also proved out at Edwards, in conjunction with the Air Force Research Lab. Schaefer said Edwards has supported the hypersonic X-51 program, both alone and in partnership with the Navy's overwater ranges. "Our telemetry reaches out into those [ranges] … so we can monitor and collect data." Hypersonics testing is likely to be a growth industry at Edwards, he said. "Based on whatever's coming next from those program offices, we will set aside the right people and facilities for hypersonics."

A similar pattern will be followed for directed energy systems. Edwards has special range equipment designed to calibrate and measure DE, especially lasers.

IN AT THE START

Schaefer explained that the test center is involved in a new program "right from the beginning." That way, the expense of proving the technology out is budgeted at the start, and so Edwards or Eglin have plenty of lead time to put in place the facilities, talent, and other support requirements necessary before a system comes out for testing. Test is kept in the loop in case there are delays, so that the test force doesn't create a "standing army" of evaluators waiting around with nothing to do.

The KC-46 team is already up and running. A detachment is at Boeing's Seattle plant monitoring the testing of the commercial precursor to the tanker, called the 767-2C. Once the fully equipped tanker is available, it will be tested by the detachment from Seattle initially, then come down to Edwards. This will happen imminently.

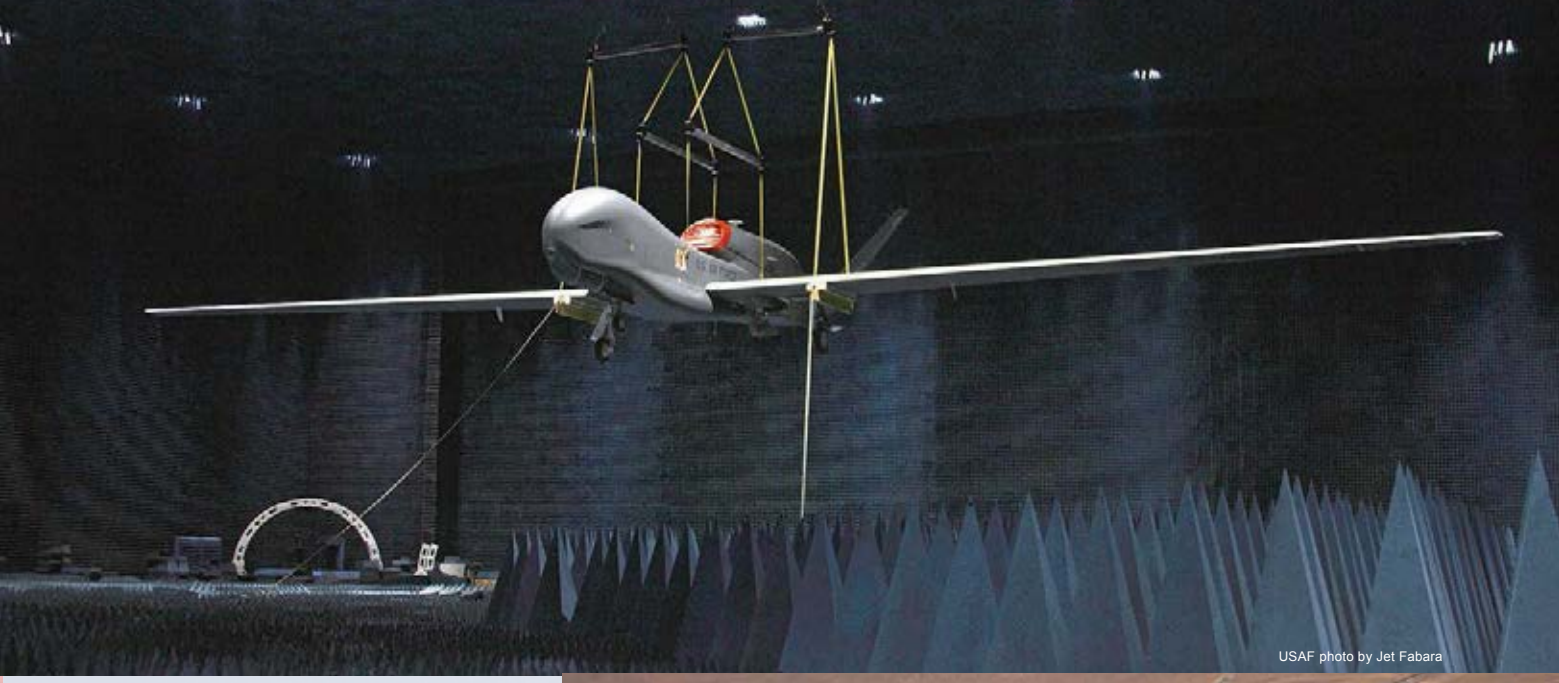
All testing is "phased in as the need grows over time," Schaefer said.

Some of the ongoing test projects at Edwards include:

Bombers: "We just finished developmental test on what I call the 'B-1C,'" said Lt. Col. Michael Williams, commander of the 419th Flight Test Squadron (FLTS), a unit testing bombers. The project knitted together 12 independent hardware and software upgrades inside the cockpit and inside the B-1's capacious cargo bays. Williams also said that he's preparing to test the Long-Range Standoff Missile, an antishipping weapon developed from the Joint Air-to-Surface Standoff missile, or JASSM. It will be fielded first on the B-1B. Work continues on B-52 modifications that will allow internal carriage of modern "J-series" weapons, and the squadron is also testing the latest B-2 improvements that amount to "a kind of midlife upgrade," Williams said. The 419th typically has two B-1Bs, two B-52s, and one B-2 to work with. The B-2s usually come directly from periodic programmed depot maintenance at Northrop Grumman's Palmdale, Calif., plant, so that they have the most up-to-date configuration.

Fighters: With responsibility for F-15s, F-16s, and T-38s, the 416th FLTS recently wrapped up work on the Ground Collision Avoidance System, already credited with two "saves" as pilots in imminent danger of hitting terrain were pulled away by the GCAS. "It's really good to know we have helped save lives with this work we're doing," said 416th FLTS commander Lt. Col. Robert Ungerman III. The 416th is heavily involved with testing Saudi Arabia's new F-15S, including "several dozen things that have never been done on an F-15 before," he said. When foreign military sales customers request flight testing of a system that the Air Force doesn't have, the customer pays the expenses of testing "to get the rigor and quality work that we do," Ungerman said. The information is also useful for possible future USAF upgrades.

Heavies: The 418th FLTS handles testing for the C-17, C-5, KC-135, KC-10, and some C-130 variants. In April, the C-17 work included recertifying the aircraft type for parachute drops using new parachutes being fielded by the Army. The C-17 was being fitted with an old F117 engine—taken off a retired test Globemaster III—to see how volcanic dust would affect it. "We really have no



USAF photo by Jet Fabara

A Global Hawk hangs in the Edwards anechoic chamber. Largest in the world, it allows electronics testing of whole operational aircraft—including bombers like the B-52—without interference.



Lockheed Martin photo by David A. Henry

A Royal Danish Air Force F-16 flies chase on the Lockheed Martin "Catbird" aircraft—a flying laboratory that tests F-35 avionics and software before they are installed in the fighter.

data on what that dust does to an engine," said 418th FLTS commander and combined test force director Lt. Col. Eric Bippert. The data have been requested by the FAA, because so many commercial airliners have had to divert around volcanic eruptions in recent years. A recent series of tests proved the value of adding vortex generators to the C-17 to improve fuel consumption, but that modification is not yet funded for the fleet. The unit is also "in the planning stages" for KC-46 tanker work, scheduled to begin at Edwards sometime in the next year. Software updates are also being tested on the C-5M, the up-engined and improved version of the Galaxy that first went to the field a few years ago.

One of the Edwards assets that Schaefer said doesn't get much attention is its anechoic chamber. It's a huge "silent" facility—the largest in the US—covered inside with foam spikes and other signal attenuation equipment to permit electronic systems to be tested on the ground.

"We can put a full-size bomber inside the chamber and do electronic warfare testing," he explained. "We can turn on all the systems. … We can radiate inside the chamber and inject … signals to stimulate the systems … to see if it's working correctly." Given that the biggest expense of flight test is "when you take off and the wheels are in the well," finding problems on the ground and refining the test card in the chamber is a big money-saver, Schaefer said.

"We find problems at low cost, before it gets to open-air flight test," he said.

Despite its remote location in the high desert some two hours north of Los Angeles, Edwards does have some encroachment issues. Wind farms "have grown like a virus across the hillside," Radomski said. While the Air Force supports clean energy, the turning rotor blades—"moving pieces of metal"—play havoc with radars.

"So, effectively, we've given up radar testing with our aircraft pointed to the west, because there's such a big interference from those wind farms," he said. "We've got to point away from them to do clean radar testing."

Base leaders have asked local jurisdictions to confine the wind farms to the already compromised western area. The north and east of Edwards are still good for radar testing and Air Force officials would like to keep it that way.

Bandwidth is constrained: Electromagnetic interference is creeping closer to the frequencies allocated for the US military. Cell phones and broadcasts interfere with telemetry in the L- and S-bands, Palmer said. As data requirements for testing bloom, however, bandwidth quickly gets maxed out. Although Edwards usually has up to a dozen F-35s available for testing, "we can only support three in the air at a time" due to the spectrum limitations, he said. "We just gave up 25 MHz in the L-band to a local phone company." The base is trying to stay ahead by doing more data compression, but that approach imposes limitations of its own.

Despite all the challenges facing Edwards, overcoming them is what flight test is all about. Radomski said he's excited that "we could be looking at every airframe" now in the Air Force's modernization plan in the next 10 years.

"Our workforce shaping that Air Force for the next 50, 60 years—that's a great honor," he said. "And the people around here love to be a part of it." ✪

Agile Combat Support

By Marc V. Schanz, Senior Editor

It takes long-term planning to quickly deliver airpower.

IN early 2014, the Air Force anticipated drawing down from a large and sustained expeditionary footing in Afghanistan and Iraq over the past 12 years to a smaller overseas presence. It would move into a period where it could "regroup, reset, and retrain," as Assistant Vice Chief of Staff Lt. Gen. Stephen L. Hoog put it. Despite budget pressures, the projected dip in operations tempo would allow the service to retool and reorient its infrastructure.

But USAF did not pack up and go home. Instead, the service responded to a rapid succession of crises in 2014 that called for sustained air, space, and cyberspace power to react quickly and effectively.

In February 2014, Russia illegally seized Crimea from Ukraine, reanimating concerns about revanchist Russian military activity in Europe and spurring new theater security cooperation efforts.

ISIS terrorists rampaged through Iraq last June, leading USAF to contribute both combat and air mobility forces.

This was followed by the Ebola outbreak in Western Africa. It called for Air Force contingency response group forces to set up mobility hubs.

In all three contingencies, the Air Force's unique ability to deploy rapidly and sustain forces was tested. 2014 showed why agile combat support (ACS) is critical to Air Force core capabilities—and linked to prosecuting the modern American way of war.

ACS, as a mission, is the connective tissue of airpower and involves the creation, growth, and support of combat capability, from garrison forces to operations on a bare airfield. Aspects of this mission range from providing base shelters and airfield vehicles to supplying life support equipment to testing and calibrating weapons and maintaining stocks of war materiel around the world. ACS meets a vast range of materiel needs and acquisition requirements across the force.

As the Air Force adjusts its footprint around the world and ponders rebalancing forces across the Active Duty, Air National Guard, and Reserve, the future of the ACS mission is getting close study at the highest levels of the service.

Senior leaders overseeing ACS note it is slightly difficult to describe. It represents a nebulous USAF core competency rather than a single platform or weapon. As one official said, ACS is all of the pieces of acquisition that don't fit into neat boxes or have clearly delineated program offices for one capability, such as with most combat and mobility aircraft. "We support every airman, every aircraft, every day," said Col. Gregory J. McNew, the deputy program executive officer and director for agile combat support at the Air Force Life Cycle Management Center at Wright-Patterson AFB, Ohio. "From the very first time someone shows up at [basic military training], to when they are touching aircraft, … there is something associated with ACS that makes their mission happen," he said.

McNew's statement is representative of all the various aspects of ACS sustainment and why it is intertwined with so many other mission areas. AFLCMC's Agile Combat Support directorate executes an annual budget of over $5.1 billion. Billions more are closely connected to the ACS mission through the programs and operations of other organizations, such as Air Mobility Command. The ACS shop encompasses some 1,700 military, civilian, and contractor personnel in various locations spread across seven divisions: USAF sustainment activities



related to metrology and calibration of instruments and aircraft (the METCAL directorate); automatic test systems; electronic warfare and common avionics; environmental and industrial engineering; human systems; simulator systems and support equipment; and vehicles.

These offices ensure the successful delivery of a vast array of products, services, and capabilities in ACS, from the provision of cold weather and chemical, biological, nuclear, and radiological uniforms to sensitive countermeasure equipment for nearly every aircraft in the Air Force's inventory to ammunition trailers and fire trucks for bases both here in the US and for deployed locations. "It's not very easy to describe," McNew conceded. "No two divisions [are] the same. But we do an awful lot of sustainment work. It's a lot of stuff that's out there and fielded and in ongoing operations." The ACS mission helps USAF reduce the need for massive inventories, at home and forward deployed, using what is known as "time-definite delivery" logistics to ensure steady resupply of forces. These needs must be balanced across USAF's component commands and the world's combatant commands.

ACS needs are largely worked out via demands and requirements from an organization or component command, whether from Air Combat Command, Air Mobility Command, Air Force Global Strike Command, or elsewhere.

"When a squadron deploys, they have a table of allowances to take with them," said McNew. The TOA dictates how much of a component or piece of equipment must be deployed as well. "Our role is to make sure we are doing the best we can with the funds we are given to make sure we are managing the whole portfolio properly." The ACS directorates must balance needs, and prioritize, as sometimes "we don't always have all the pieces we need or are supposed to have," he said. Components can be broken, have performance issues, or can be on tap for disposal and replacement.

A BALANCING ACT

Making sure airmen don't go looking for support and sustainment equipment for tasks when they are needed is a big challenge, McNew observed. "We have to balance across that portfolio and replenish things as best we can."

Timely sustainment means effective operations. "If you can't operate the base," Hoog said in an April 29 speech to the Air Force Association's Mitchell Institute for Aerospace Studies, "you sure as heck can't fly from it." ACS, as a result, is part and parcel of the Air Force's flexibility and provides an agile footprint in operations from home garrison training to humanitarian disasters to air campaigns.

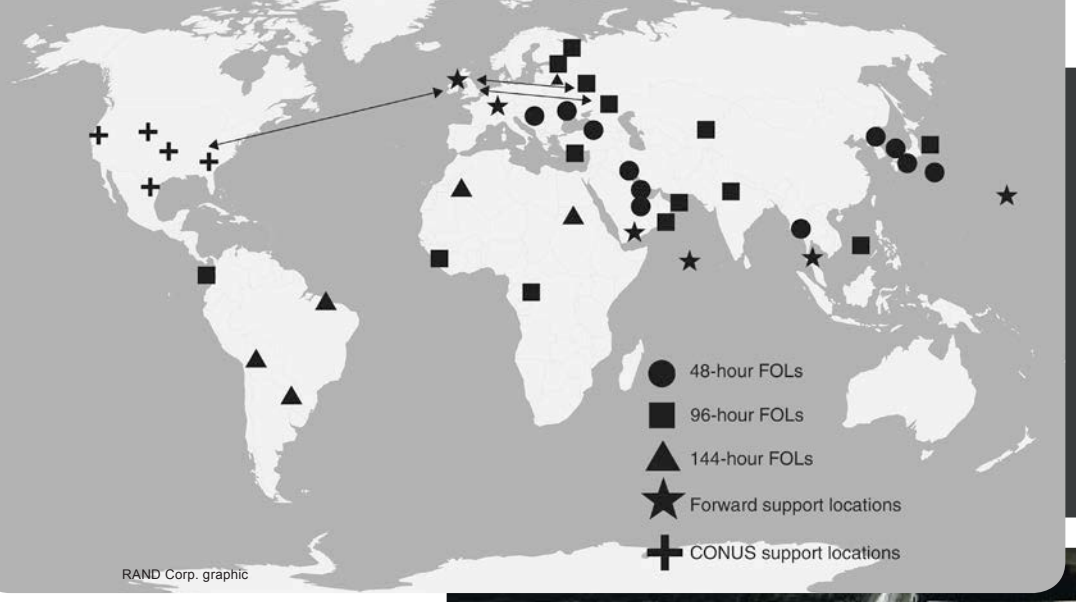
This capability must be exercised and practiced, in turn. Just as vital to USAF's combat power as Red Flag, efforts such as Silver Flag are key to keeping ACS adept and flexible.

The Silver Flag exercise has grown over the past decade to draw in other career fields and specialties involved in standing up and sustaining base operations, such as engineers, explosive ordnance technicians, communications airmen, force support personnel, and others. (See "Don't Call it a Comeback," p. 20.) Practicing expeditionary sustainment of air operations is a focus area in Pacific Air Forces, for example, and Silver Flag is a critical tool to this end. At Andersen AFB, Guam, Silver Flag training on the island is expanding to return explosive ordnance disposal (EOD) training to the SF curriculum. The exercise moved to Guam from its previous location at Kadena AB, Japan, last year, and is vital to preparing airmen to set up and operate in expeditionary environments. Part of the Pacific Regional Training Center on the island, Silver Flag trains an estimated 1,200 Air Force engineers and support airmen across 13 specialty codes, many of them involving core ACS tasks such as airfield damage



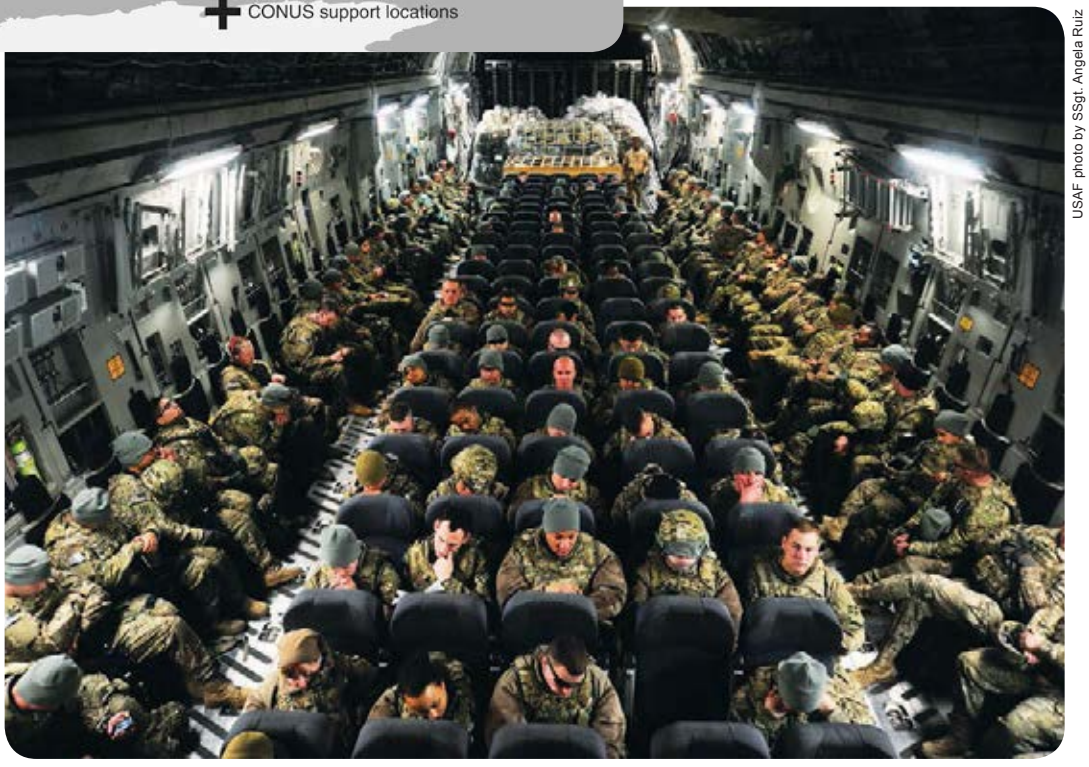
C-17s take off at 30-second intervals during a large-formation exercise, Crescent Reach, in May. Agile combat support ensures USAF's diverse units have the equipment for their varied missions.

USAF photo by TSgt. Nathan Lipscomb



RAND Corp. graphic

Below: A C-17 is packed with US soldiers and equipment on the way to an overseas deployment. The agile combat support mission includes providing base shelters, testing and calibrating weapons, and supplying materiel and personnel in short order worldwide. Left: A RAND graphic shows a notional overview of an evolving ACS system. It depicts a diverse set of forward operating locations (FOLs), forward support locations (FSLs), and CONUS support locations.



USAF photo by SSgt. Angela Ruiz

repair, electrical systems, and water purification. EOD is slated to return to the Silver Flag curriculum in 2016, according to Andersen officials.

Because of its role supporting and sustaining expeditionary airpower, ACS is getting a lot of analysis at the Air Staff level, particularly in the aftermath of last year's report by the National Commission on the Structure of the Air Force.

Hoog stated that after more than two decades of near-constant combat operations following the end of the first Gulf War, the Air Force has a good idea of components, requirements, and support services it needs to rapidly stand up combat abilities anywhere in the world. "We know what it takes. … We have all been through the basic [air and space expeditionary force] training where you start with an airfield that's 8,000 feet with potable water, and you build out combat capability." He said Air Force engineers have performed exceptionally, doing earth work and building forward operating bases in Iraq and Afghanistan, and the Air Force's contingency response groups are often called on to deploy quickly and set up air base operations on short time lines, a complicated task requiring a fine-tuned ACS system.

The question is, though, "what [is it] going to take to support the combination of in-garrison operations and agile combat support at the same time?" Hoog asked in April. Finding a balance between these, and managing operations tempo requirements, will be important. Metrics for supply and demand must be tracked, among ACS, the components, and the regional commanders. "We look closely at cost and health of funding, to commitments we have made to our customers," McNew said. "But a lot of what we do is make sure we deliver the items we are charged with acquiring and putting them back in the field." Sometimes this is contract logistics support, other times it could be supporting organic depot maintenance or swiftly putting replacement equipment back to work.

VARYING DEMANDS

But priorities change—and sometimes quickly. When it comes to urgent needs, the ACS apparatus has to juggle resources, to push and pull in the right places for USAF to act promptly and decisively, McNew said. Once a need is identified, resources and planning and engineering must shift from other areas and this puts a certain amount of risk on other less important areas at that given time. "We will get money, because the [combatant commander] says, 'Hey, we need you to go buy these things.' But we don't get any more manpower, so we have to balance the assets that are most important and take priority." Recent examples include the rapid fielding of 260 improved ballistic protection helmets for aircrews in USAF's helicopter fleet—reducing the weight of the helmet while doubling its protection level—and successful efforts to develop a new transportation isolation system for moving contagious personnel. This met an urgent need last summer with Operation Unified Assistance, McNew said. Agile combat support personnel helped to perform

certifications for a system that could bolt into a C-17 or a C-130 and safely move large numbers of patients if needed.

ACS supply and demand varies from theater to theater, but despite the completion of the Afghan drawdown, a persistent stream of requirements continues to need close monitoring at US Air Forces Central Command, for example. As an enterprise, the Department of Defense has continued to try to minimize its on-hand inventories, as large theater depots are costly, noted Lt. Col. Marshall Perry, the deputy director in AFCENT's logistics and mission support directorate. For AFCENT, "this is a balancing act when focusing on agile combat support" and having materiel and supplies close to the fight. As such, AFCENT's logisticians have to take into account requirements of the theater and in the US and attempt to optimize the logistics pipeline to meet anticipated demands.

It is not easy to foresee ACS needs for CENTCOM, Perry claimed, because of its austere operating environments, the sometimes minimal support infrastructure, country specific supply mandates and customs duties, and limited airlift and storage capacity. Not everything can be called up quickly from the US, and some supplies must be maintained in theater.

Even before combat operations over Iraq and Syria geared up last year, AFCENT maintained a network of some $3 billion in pre-positioned "war readiness materiel" or WRM throughout the theater, staged at Al Udeid AB, Qatar, and numerous other locations throughout the Middle East and Persian Gulf region. According to Perry, this WRM "is the key to agile combat support from a logistics perspective." The components of these war reserve caches vary, but include ACS items such as expeditionary airfield resources, vehicles and parts, fuel equipment, medical equipment, concertina wire, sandbags, racks, and pylons. A combination of these supplies is maintained at an "appropriate storage level," ready to respond if necessary, he said. Because they are located in theater, the arrival time drops significantly, a critical factor in short-notice missions, which routinely emerge across CENTCOM.

These war reserve caches were called upon as Operation Inherent Resolve got underway last August and the US and coalition allies returned aircraft to theater and stood up new units across the region. AFCENT works to "validate historical demand data and current mission tasks," Perry explained, so it can estimate what items will be in the highest demand and must be at the "closest point of utilization." For example, after anti-ISIS operations last August, AFCENT's logistics and mission support directorate reviewed aircraft flying hours, to better prepare for spare parts and aerospace ground equipment needs. The command is also tracking flight hours to watch trends in fuels, munitions, and support personnel required. As these items are reviewed, they are passed along to supply hubs and centers and make their way back through the ACS system. "It is a constant effort of validating ever-changing requirements," Perry said.

Hoog said this dynamic is a big reason "some of our highest operations tempo is on the agile combat support side," such as for explosive ordnance disposal airmen and contracting experts.

"We look at this, and the relationships between Active and Guard and Reserve [are] all in that mix," Hoog said in April. How many RED HORSE engineering units must the Air Force retain in the Active Duty force structure—versus the number it should keep in either the Air National Guard or the Reserve—in order to maintain a surge capacity? These are cases where the mission is well-suited for the reserve components—able to leverage experience in engineering or contracting—and airmen who work with equipment in civilian life and can be activated to use these skills downrange, Hoog stated. "As we speak, we are doing analysis as to maybe we move some [units] back and forth."

Regardless of where the capability resides, ACS will continue to prioritize and meet a demand signal showing no sign of drawing down.

"We don't make operational missions happen," McNew said. "Our operators do that. But behind the scenes, we do the acquisition that puts out into the field the things that are used every single day, … [which] our airmen use to accomplish the mission around the world. And we are proud of that." ✪

USAF photo



USAF photo by Scott M. Ash



Above: John Goines, chief of the Life Science Equipment Laboratory, compares survival vests from crashes in the late 1960s as part of a forensic investigation. Left: Lt. Gen. Stephen Hoog, assistant vice chief of staff, answers questions during an Air Force Association discussion. Hoog said some of USAF's highest operations tempo are in ACS areas.

RUSSIAN AIRPOWER

Almanac • 2015

By Piotr Butowski

ABOUT THE RUSSIAN AIRPOWER ALMANAC

On the following pages, we present a variety of information about the modern Russian air force, including its organization, leadership, aircraft, weapons, deployment, and other capabilities. It has been compiled from open sources inside and outside of Russia.

When the Soviet Union collapsed in 1991, Russia's air force entered a long decline, as budgets and flying time plummeted and new developments languished. In recent years, though, Russia has begun reinvesting in its airpower. Old systems have been upgraded and new systems are entering service. The Sukhoi T-50 fighter—advertised to be a fifth generation, stealthy analogy to the USAF F-22—is well along in flight test, and first deliveries are a year away. Russia also promises a modern stealth bomber in the early 2020s. In the meantime, it has ordered several squadrons' worth of the Su-35S, considered the apex of the Flanker series, and has pledged to put the huge Tu-160 Blackjack bomber back into production.

Russia has also ratcheted up its readiness with greater attention to flying time and exercises. Those exercises—along with wars against Georgia and Ukraine and aggressive actions near NATO and US airspace, ships, and bases—are to signal that Russia means to aggressively reverse its long military decline.

Here, we present a time line of the Russian air force rebuild and some of the key milestones on its path toward reasserting its airpower.

1991

When the USSR disintegrated, 15 Soviet republics became 15 independent states, organizing into a new Russian Federation on Christmas 1991. Declaring itself the heir of the defunct USSR—and of most of its military assets—Russia claimed a place as a permanent member of UN Security Council.

While each of the Soviet Union successor states organized its own armed forces, Russia's were the largest, and it pulled back within its new borders the bulk of what had been the Soviet air forces. Under the old regime, only 40 percent of combat aircraft were based in Russian territory, and they were usually the oldest ones. After the consolidation, two-thirds of the former Soviet air forces resided in the new Russia.

1998

Soviet air assets had been distributed among the air force, air defense forces, navy, and ground forces. In 1998, they were reorganized, and the majority of air defense components—surface-to-air missile units, interceptor fighter forces, and the radar airspace observation network—were transferred to the air force. The remainder of air defense—i.e., the ballistic missile warning system, Moscow missile defense corps, and space control network—were transferred to strategic rocket forces and, in March 2001, to the newly created space forces (known since 2011 as the air and space defense forces). The cost-cutting reorganization reduced personnel by 20 percent. Afterward, just 70 air regiments remained from the previous 100 (and 37 anti-aircraft missile regiments).



In early 2003, Russian army combat and transport helicopters were put under control of the air force; since then, the army has not owned any aviation assets. Eight armies were put under the air force, as well as some direct reporting units (including test and evaluation centers, pilot schools, scientific institutes, repair plants, and storage bases).

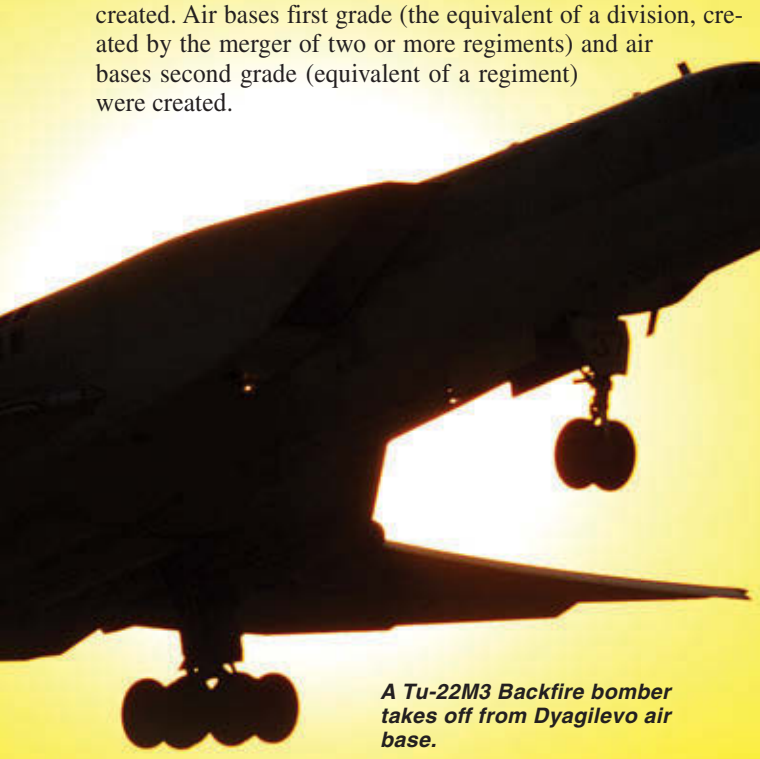
Two air armies were created: one for long-range bombers and tankers and another for strategic transport aircraft. Six other air and air defense armies were created for regional commands. The structure was further refined during the next four years, and more units were disbanded.

2008

Despite having air superiority during the short war with Georgia in 2008, the Russian air force lost six aircraft in five days of combat, including a Tu-22M3 bomber. Radical changes followed.

Defense Minister Anatoly Serdyukov in late 2008 ordered a broad reorganization. The air force's 160,000 personnel would be cut by 36,000, and air armies would be transformed into operational commands. Bombers and transports were put under the control of Long-Range Air Command and Military Transport Air Command, respectively. The six territorial air force and air defense armies were reorganized into four AF and AD commands tied to new military districts.

At lower levels, air bases—roughly analogous to a US Air Force air base wing, including aircraft and facilities both—were created. Air bases first grade (the equivalent of a division, created by the merger of two or more regiments) and air bases second grade (equivalent of a regiment) were created.



A Tu-22M3 Backfire bomber takes off from Dyagilevo air base.

The air force and navy played tug-of-war with some aircraft, notably some Su-27s and MiG-31 interceptors, but these aircraft ended up with the navy. However, in 2011, the Russian navy's Tu-22M3 medium bombers—previously the main aerial counter to American aircraft carriers—were transferred to the air force permanently.

Rising oil income allowed Russia to begin an earnest modernization of its air forces in 2008. Most of its equipment dated back to before 1991, but modest (and slow) upgrades had been in motion since 2004 on a variety of aircraft. One of the few new pieces of gear acquired during the lean times was the Kh-555 strategic cruise missile—the non-nuclear version of the Kh-55.

In late 2008, however, the Defense Ministry announced orders for some 248 new tactical aircraft (exercising an option for 32 further strike airplanes four years later) as well as 89 new jet trainers. Naval aviation is receiving 24 MiG-29K carrier-based fighters, ordered in 2012. A total of 693 attack, transport, and utility helicopters were also ordered.

The banner year was 2014, when the Russian air arms took delivery of 142 combat, trainer, and special duty aircraft (including about 30 midlife upgrades) and 135 combat, transport, and trainer helicopters.

During this period, flying hours expanded, thanks to more funding for fuel, overhauls, and service life extensions. Pilots in tactical aviation, who in the lean years could only expect 20 to 25 flying hours per year, now got 60 to 100 hours, while transport pilots got about 120 hours.

Air bases also got long-deferred maintenance and improvements, starting with those hosting flight test, the central command, and strategic bombers. Tactical bases are next in line.

2012

Serdyukov was fired in the wake of a bribery scandal, and his successor, Sergey Shoygu, ordered a reversal of some of Serdyukov's changes. Air regiments with combined but geographically separated equipment were consolidated. The old-style regiments, divisions, and other unit designations were restored, as were the air armies, which replace the operational commands. While the number of regiments dropped 50 to 60 percent, the number of aircraft per unit increased, and these also have more modern gear.

Tactical squadrons now have about 12 aircraft (plus one or two combat trainers), and long-range bomber squadrons have about 10 aircraft. Helicopter squadrons generally have 20 aircraft.

After the Crimea annexation in 2014, Russia quickly deployed military forces—including air forces—to the peninsula. A naval aviation unit in Crimea—there with Ukraine's consent before the invasion—was beefed up with new Su-30SM fighters.

2015 AND BEYOND

Russia is establishing a greater presence in the Arctic, given both the discovery of large oil and mineral reserves there and increased sea traffic as the waterways become increasingly ice-free. Headquartered at Tiksi, a new Joint Strategic Command has been formed, with linkages to the Northern Fleet, which will have its own air and air defense units. These will have both interceptors and attack jets. Some 13 airfields in the Arctic are to be repaired and restored to front-line service.

Russian military spending has increased substantially. It was 15.5 percent of the national budget (or 3.2 percent of the gross domestic product) in 2013, growing to 19.2 percent (3.7 percent of GDP) for 2014 and was planned to be 23 percent of the state budget (4.6 percent of GDP) in 2015.

Russia's economy has suffered a double hit in recent years, though. Oil prices have declined steeply, and Western economic sanctions—imposed after the Crimea annexation and also because of Russian-supported attacks in Ukraine—have taken a toll. The ruble has been severely devalued, but it remains to be seen whether President Vladimir Putin will allow the situation to drive cuts in military growth. The nation's military resurgence is popular with the Russian public and backstops Putin's aggressive posture toward Europe.

THE ORDER OF BATTLE

2015 Russian Air Force Almanac

Note: All data as of May 2015

AIR FORCE

The Russian air force has 148,000 people, about 2,000 aircraft (including 1,200 combat-capable ones) and 900 helicopters (including 300 combat-capable ones).



Main Command of the Air Force

HQ: Balashikha
Commander in Chief: Colonel General Viktor Bondarev, since May 6, 2012

Direct reporting units

Unit	Location	Inventory
800th Air Base	Chkalovsky	Special transports
929th National Flight Test Center	Akhtubinsk	
4th National Air Personnel Preparation and Military Evaluation Center	Lipetsk	
Unknown regiment	Lipetsk	Tactical combat aircraft
Unknown squadron	Savasleyka	MiG-31
237th Air Technology Demonstration Center	Kubinka	Su-27, MiG-29, An-30
344th Combat Training and Flight Crew Training Center of Army Aviation	Torzhok	Helicopters
924th National Unmanned Aircraft Center	Kolomna	Pilotless vehicles

Training air bases

Unit	Location	Inventory
116th Training Center of Combat Application	Privolzhsky (Astrakhan)	MiG-29
192nd Training Air Base	Tikhoretsk	L-39C
195th Training Air Base	Kushchevskaya	L-39C , Su-27, MiG-29, Su-25
200th Training Air Base	Armavir	MiG-29, L-39C, Yak-130
205th Training Air Base	Balashov	An-26
209th Training Air Base	Borisoglebsk	Yak-130, Su-25
213th Training Air Base	Kotelnikovo	L-39C
217th Training Air Base	Rtishchevo	L-410
219th Training Air Base	Michurinsk	L-39C
221st Training Air Base	Shagol (Chelyabinsk)	Tu-134, An-26
272nd Training Air Base	Maykop	L-39C
339th Training Air Base	Sokol (Saratov)	Mi-8, Ansat, Ka-226, Mi-2
	Syzran	Mi-24, Mi-8



Many Russian bases are designed with revetments to protect aircraft, such as these Tu-22M3s, in case of an attack.



Long-Range Air Command

37th Air Army of High Supreme Command (Strategic Purpose)
as of Aug. 1, 2015

HQ: Moscow
Commanding Officer: Lieutenant General Anatoly Zhikharev, since Aug. 5, 2009

Unit	Location	Inventory/Notes
6950th Air Base	Engels	
	Engels	Two squadrons Tu-160, two squadrons Tu-95MS
Air Group A	Shaykovka	Three squadrons Tu-22M3
Air Group E	Olenyegorsk	Two squadrons Tu-22M3
6952nd Air Base	Ukrainka (Seryshevo)	
	Ukrainka (Seryshevo)	Four squadrons Tu-95MS
Air Group V	Belaya (near Irkutsk)	Four squadrons Tu-22M3, two Tu-22MR reconnaissance aircraft, An-30
43rd Combat Training and Flight Crew Training Center	Ryazan (Dyagilevo)	Tu-22M3, Tu-95MS
27th Composite Air Regiment	Tambov	Tu-134UBL, An-26
203rd Independent Tanker Air Regiment	Ryazan (Dyagilevo)	Two squadrons Il-78



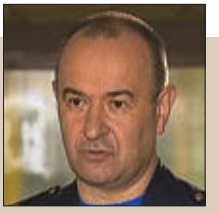
An Engels-based Tu-95MS strategic bomber takes on fuel from an Il-78 Midas tanker.



The Il-78M crew of Bort 51 blue putting the aircraft through its paces at Ryazan (Dyagilevo) air base.



Tu-160 Blackjack maintainers servicing the giant bomber at Engels air base.



Military Transport Air Command

61st Air Army of High Supreme Command (Military Transport Aviation)
as of Aug. 1, 2015

HQ: Moscow
Commanding Officer: Lieutenant General Vladimir Benediktov, since January 2013

Unit	Location	Inventory/Notes
12th Military Transport Air Division	Migalovo (Tver)	
196th Military Transport Air Regiment	Migalovo (Tver)	Il-76, An-22
334th Military Transport Air Regiment	Kresty (Pskov)	Il-76
566th Military Transport Air Regiment	Seshcha (Bryansk)	An-124, Il-76
708th Military Transport Air Regiment	Taganrog	Il-76
610th Combat Training and Flight Crew Training Center	Ivanovo	Il-76, other transports
144th Independent Air Regiment of Long-Range Radar Surveillance	Ivanovo	A-50
117th Independent Military Transport Air Regiment	Orenburg	Il-76, An-12PPS



1st Air Force and Air Defense Command

6th Air Force and Air Defense Army

as of Aug. 1, 2015

HQ: Voronezh
Commanding Officer: Major General Aleksandr Duplinsky, since Jan. 14, 2014

Unit	Location	Inventory/Notes
105th Composite Air Division	Voronezh	
47th Composite Air Regiment	Voronezh	Two squadrons Su-34, one squadron Su-24MR, An-30 In 2013-17, due to major repairs on the base, aircraft from Voronezh temporarily relocated to Buturlinovka.
899th Attack Air Regiment (Starting 2017)	Buturlinovka	Su-25 to be based here.
790 Fighter Air Regiment	Khotilovo	Two squadrons MiG-31, one squadron Su-27
14th Fighter Air Regiment	Khalino (Kursk)	Three squadrons MiG-29
159th Fighter Air Regiment	Besovets	Three squadrons Su-27
98th Independent Composite Air Regiment	Monchegorsk	Two squadrons Su-24M/MR, one squadron MiG-31, Mi-8, Su-34 starting from 2015
33rd Independent Composite Transport Air Regiment	Levashovo	Special transports
Helicopter assets		
15th Army Aviation Brigade	Ostrov	Ka-52, Mi-28N, Mi-35M, Mi-8, Mi-26
549th Air Base of Army Aviation	Levashovo	Mi-24, Mi-8
2nd Air Group	Pribylovo	Mi-24/Mi-35M, Mi-8
378th Air Base of Army Aviation	Vyazma	Mi-24, Mi-8, Mi-28N

The command also operates a flight of four Su-27 fighters deployed to Baranovichi air base in Belarus.



Su-34 Bort 23 red approaching a tanker. Note the extended refueling probe over the aircraft's nose.



2nd Air Force and Air Defense Command

14th Air Force and Air Defense Army

as of Aug. 1, 2015

HQ: Yekaterinburg
Commanding Officer: Lieutenant General Viktor Sevostyanov

Unit	Location	Inventory/Notes
6980th Air Base	Chelyabinsk	
	Shagol (Chelyabinsk)	Two squadrons Su-24M, one squadron Su-24MR
2nd Air Group	Bolshoye Savino (Perm)	Two squadrons MiG-31
3rd Air Group	Kansk	Two squadrons MiG-31
390th Independent Composite Transport Air Regiment	Koltsovo (Yekaterinburg)	Special transports
999th Air Base	Kant, Kyrgyzstan	Su-25, Su-27, transports
Helicopter assets		
48th Air Base of Army Aviation	Kamensk Uralsky	Mi-8, Mi-24
2nd Air Group	Uprun (Yuzhnouralsk)	Mi-8, Mi-24, Mi-26
562nd Air Base of Army Aviation	Tolmachevo (Novosibirsk)	Mi-8, Mi-24

3rd Air Force and Air Defense Command

11th Air Force and Air Defense Army

as of Aug. 1, 2015

HQ: Khabarovsk
Commanding Officer: Major General Aleksandr Tatarenko, since August 2013

Unit	Location	Inventory/Notes
303rd Composite Air Division		Khurba (Komsomolsk)
22nd Fighter Air Regiment	Tsentralnaya Uglovaya (Vladivostok)	Two squadrons Su-27SM, one squadron MiG-31, Su-30M2
23rd Fighter Air Regiment	Dzemgi (Komsomolsk)	Two squadrons Su-27SM, one squadron Su-35, Su-30M2
277th Bomber Air Regiment	Khurba (Komsomolsk)	Su-24M/M2
187th Attack Air Regiment	Chernigovka	Two squadrons Su-25SM
799th Independent Reconnaissance Air Regiment	Varfolomeevka	Su-24MR
120th Independent Composite Air Regiment	Domna	Su-30SM, Su-25
257th Independent Composite Transport Air Regiment	Khabarovsk	Special transports
Helicopter assets		
439th Air Base of Army Aviation	Chita-Cheremushki	Mi-8, Mi-24
573rd Air Base of Army Aviation	Khabarovsk	Mi-24, Mi-8, Ka-52, Mi-26
2nd Air Group	Garovka	Mi-8, Mi-26
575th Air Base of Army Aviation	Chernigovka	Ka-52, Mi-24, Mi-8, Mi-26



The Mi-26 Halo is the world's largest and heaviest helicopter. Roughly 40 remain in Russian military service.



The Soviet response to the F-111—the Su-24 (Su-24M shown here)—is gradually being replaced by the new Su-34.



4th Air Force and Air Defense Command

4th Air Force and Air Defense Army

as of Aug. 1, 2015

HQ: Rostov-on-Don
Commanding Officer: Major General Andrey Yudin, since May 2012

Unit	Location	Inventory/Notes
559th Independent Bomber Air Regiment	Morozovsk	Su-34, Su-24M
11th Independent Reconnaissance Air Regiment	Marinovka (Volgograd)	Su-24MR
535th Independent Composite Transport Air Regiment	Rostov-on-Don	Special transports
3624th Air Base	Erebuni, Armenia	MiG-29
1st Composite Air Division	Krymsk	
31st Fighter Air Regiment	Millerovo	Three squadrons MiG-29
3rd Composite Air Regiment	Krymsk	Su-27, Su-30, Ka-27
960th Attack Air Regiment	Primorsko-Akhtarsk	Su-25
368th Attack Air Regiment	Budyonnovsk	Two squadrons Su-25
27th Composite Air Division	Belbek (Crimea)	
37th Composite Air Regiment	Gvardeyskoye	One squadron Su-24M, one squadron Su-25SM
38th Fighter Air Regiment	Belbek	Two squadrons Su-27SM, Su-30M2
39th Helicopter Regiment	Dzhankoy	Mi-8, one squadron Ka-52, one squadron Mi-28N, Mi-35M
Helicopter assets		
393rd Air Base of Army Aviation	Korenovsk	Ka-52, Mi-28, Mi-24/Mi-35M, Mi-8
546th Air Base of Army Aviation	Rostov-on-Don	Mi-24, Mi-28, Mi-8, Mi-26
387th Air Base of Army Aviation	Budyonnovsk	Mi-28, Mi-35M, Mi-8, Mi-26

NAVAL AVIATION

The Russian naval aviation service has 28,000 people, about 140 combat-capable aircraft, 50 transport aircraft, and 90 helicopters.



Naval Aviation

HQ: Moscow
Commanding Officer: Major General Igor Kozhin, since August 2010

Unit		Location	Inventory/Notes
859th Combat Training and Flight Crew Training Center of Naval Aviation		Yeysk	
Northern Fleet, HQ: Severomorsk			
279th Independent Shipborne Fighter Air Regiment		Severomorsk-3	Su-33, Su-27, Su-25UTG
7050th Air Base		Severomorsk-1	
		Severomorsk-1	Il-38, Ka-27, transports
	2nd Air Group	Kipelovo	Tu-142MK, Tu-142MR
	3rd Air Group	Ostafyevo	Transports
Pacific Fleet, HQ: Vladivostok			
7060th Air Base		Yelizovo (Petropavlovsk Kamchatsky)	
	ASW squadron	Yelizovo	Il-38
	ASW helicopter squadron	Yelizovo	Ka-27
	Fighter squadron	Yelizovo	MiG-31
7062nd Air Base		Nikolayevka	
	ASW squadron	Nikolayevka	Il-38
	ASW helicopter squadron	Nikolayevka	Ka-27
	2nd Air Group	Knevichi	Transports
	4th Air Group	Mongokhto	Tu-142MZ, Tu-142MR
Baltic Fleet, HQ: Kaliningrad			
72nd Air Base		Chkalovsk	
	Fighter squadron	Chkalovsk	Su-27
Attack squadron		Chernyakhovsk	Su-24M
Helicopter squadron		Chkalovsk	Mi-24, Mi-8
ASW helicopter squadron		Donskoye	Ka-27
Transport squadron		Khrabrovo	
Black Sea Fleet, HQ: Sevastopol (Crimea)			
318th Mixed Air Regiment		Kacha	Ka-27, Be-12, transports
43rd Independent Naval Attack Air Regiment		Novofyodorovka (Saki)	One squadron Su-24, one squadron Su-24MR, Su-30SM
Caspian Flotilla, HQ: Astrakhan			
Air Group		Kaspiysk	Transports





Above: This Tu-142MK Bear-F, Mod 3, is named for the city of Cherepovets and is based at Kipelovo. Right: An Il-20RT, based at Severomorsk-1. The aircraft originally tracked space launches but now serves as a regular transport.

GRADES AND INSIGNIA

2015 Russian Airpower Almanac

UNITED STATES AIR FORCE

Officer



Second Lieutenant
(O-1)



First Lieutenant
(O-2)



Captain
(O-3)



Major
(O-4)



Lieutenant Colonel
(O-5)



Colonel
(O-6)



Brigadier General
(O-7)



Major General
(O-8)



Lieutenant General
(O-9)



General
(O-10)

Enlisted

Airman Basic
(E-1)
No insignia



Airman
(E-2)



Airman First Class
(E-3)



Senior Airman
(E-4)



Staff Sergeant
(E-5)



Technical Sergeant
(E-6)



Master Sergeant
(E-7)



Senior Master Sergeant
(E-8)



Chief Master Sergeant
(E-9)



Chief Master Sergeant of the Air Force
(E-10)

RUSSIAN AIR FORCE

Officer



Junior Lieutenant



Lieutenant



Senior Lieutenant



Captain



Major



Lieutenant Colonel



Colonel



Major General



Lieutenant General



Colonel General



General of the Army

Enlisted



Private



Corporal



Junior Sergeant



Sergeant



Senior Sergeant



Master Sergeant

The Russian Air Force grades and insignia are presented alongside their US counterparts for comparison purposes.

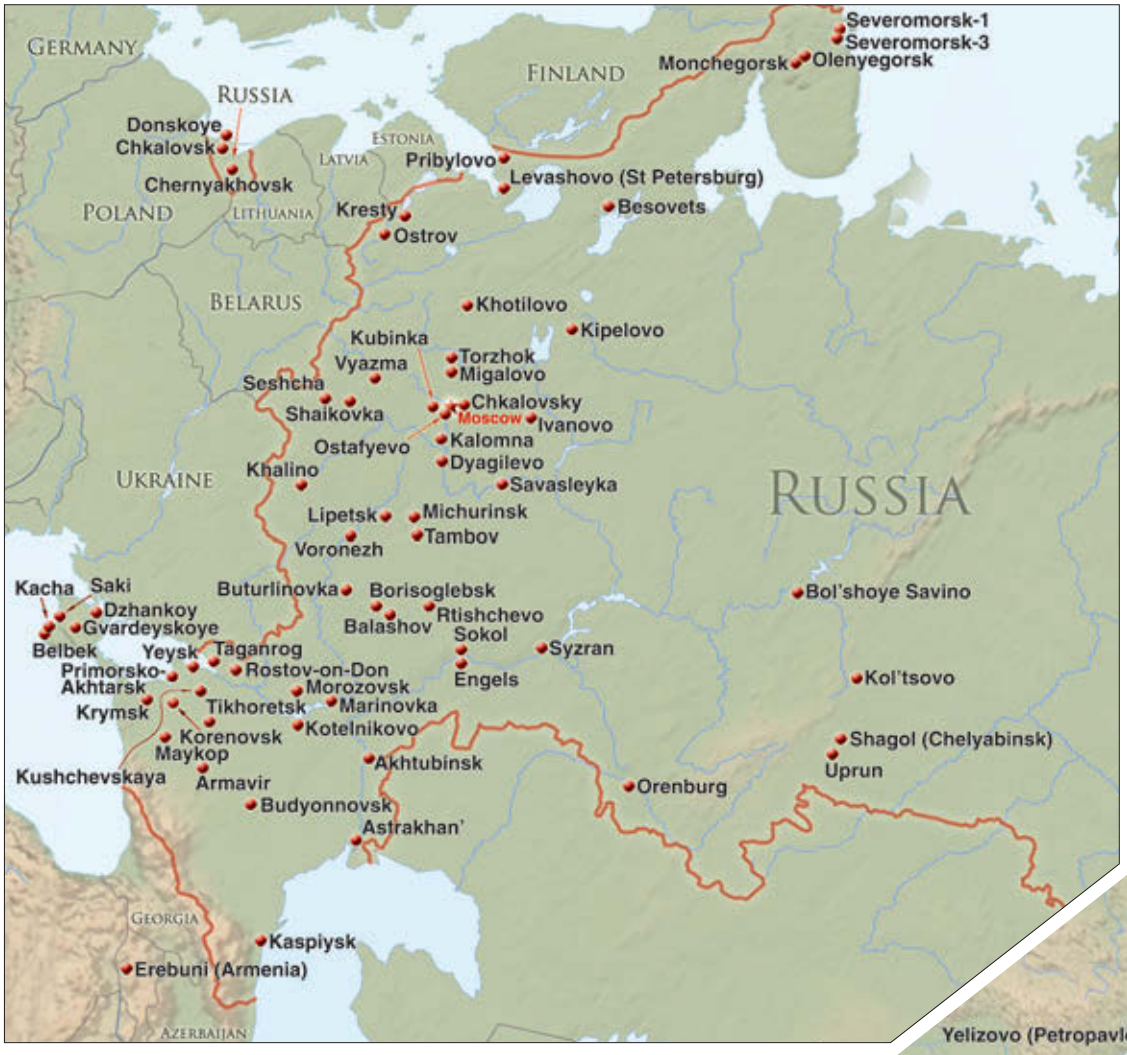
2015 Russian Airpower Almanac

Note: All data as of May 2015



Left: western Russia.

Below: eastern Russia.





Maps by Zaur Eylanbekov

A Tu-95MS Bear-H and Il-78 tanker imitate aerial refueling, escorted by MiG-29s during a Victory Day parade.



Su-27SM Bort 06 based at Lipetsk is a multirole fighter upgrade of the standard Flanker-B and first appeared in 2002.



Above: The MiG-29SMT based at Lipetsk is an upgraded version of the early fighter, with new radar, avionics, inflight refueling, and increased fuel capacity (evidenced by the enlarged spine).

All Tu-160s are named for famous Soviet or Russian pilots, aviation designers, and engineers. Here, personnel at Engels air base christen Blackjack Valentin Bliznyuk, in honor of the aircraft's chief designer.



An-22 departing Migalovo air base near Tver.



A Tu-22M3 Backfire forming up off the right wing of a Tu-95MS Bear.



A Lipetsk-based MiG-29. The ball in front of the canopy is the MiG's infrared search and track and laser rangefinder.



An electronic warfare version of An-12 seen at Akhtubinsk.



A Su-35 flying a display routine at Ramenskoye, near Moscow.



An upgraded A-50U Mainstay, stationed at Ivanovo. The AWACS platform based on the Ilyushin Il-76 airlifter was modified by Beriev and first flew in December 1978.



The largest military airlifter in the world completed its maiden flight in December 1982. Fifty-five examples of the An-124 have been built, and 26 remain in Russian air force service.



A pair of Su-24Ms on a training mission.





A Bear crew at the controls of a Tu-95MS during a training mission from Dyagilevo air base.

GALLERY OF AIRCRAFT

2015 Russian Airpower Almanac

Note: All data as of May 2015

By Piotr Butowski

LONG-RANGE BOMBER AIRCRAFT



Tu-22M3 Backfire-C

Tu-22M3 • NATO reporting name: Backfire-C

Brief: Intercontinental strategic bomber with variable-geometry wing, designed for supersonic missile delivery. Despite rumors it was offered to China and India, it was never exported outside the Soviet Union. Backfire was a subject disagreement between the US and Soviet Union during Strategic Arms Limitation Talks (SALT II). The US demanded it be included in limits on strategic aircraft, while the Russians argued it should not be included because, due to the fleet's location and capabilities, it was incapable of directly attacking the continental US. The eventual treaty signed on June 18, 1979, excluded Backfire from the strategic arms limits, provided its in-flight refueling capability was removed and production was not increased. Tu-22M's priority Cold War targets were US aircraft carriers and cruise-missile armed cruisers in the Mediterranean and Atlantic Ocean (in the maritime role). Its primary aim in a major move against NATO was to have been cutting US supply lines to Europe by destroying strategic harbors and airfields. Backfires saw limited action in regional wars, employing free-fall bombs rather than strategic weapons. Tu-22M2s struck targets in Afghanistan in 1984, and again between October 1988 and January 1989, covering the Soviet withdrawal. The aircraft flew some 100 sorties over Chechnya from November 1994 to January 1996, dropping conventional bombs and providing battlefield illumination. The bomber most recently flew strikes during the 2008 invasion of Georgia, where it suffered its first combat loss to a Georgian anti-aircraft missile. The latest Tu-22M3M variant resulted from an MLU that added new radar, improved navigation and communications systems, self-defensive suite, and digital flight controls.

Extant Variants:
- Tu-22M3. Missile carrier version.
- Tu-22MR. Reconnaissance version; two in service at Belaya air base.
- Tu-22M3M. Upgraded version.

Function: Supersonic long-range bomber, missile carrier, reconnaissance.
Delivered: 1969-93.
Inventory: 100+.
Accommodation: four.
Dimensions: span 76 ft 5 in swept to 112 ft 6 in spread, length 139 ft 4 in, height 36 ft 3 in.
Weight: max T-O 273,373 lb.
Ceiling: 45,932 ft.
Performance: dash speed 1,429 mph, 621 mph at S-L, operational radius 1,367 miles.
Armament: standard one, max three Raduga Kh-22/Kh-32 supersonic 310-mile-range missiles. Up to 42 x 1,100-lb, or eight 3,300-lb, or two 6,600-lb general-purpose bombs. Nuclear bombs; sea mines.



Tu-95MS Bear-H

Tu-95MS • NATO reporting name: Bear-H

Brief: A Russian counterpart to the US B-52. The world's fastest turboprop aircraft. Initial Tu-95 production at the Kuibyshev (Samara) plant from 1955 to 1969 covered several versions including the Tu-95M bomber, Tu-95K missile carrier, and Tu-95RTs maritime reconnaissance version, the last of which was retired in the early 1990s. Production of the Tu-142 maritime patrol aircraft was based on a highly upgraded Tu-95 design. With the advent of long-range ALCMs in the 1970s, Tu-95 production was relaunched after a 13-year hiatus. The resulting Tu-95 MS was based on a converted Tu-142 ASW airframe, to carry the Kh-55 missile. An MLU ordered in 2009 is adding new radar, a five-panel glass cockpit, and modern flight controls and navigation systems. The first three aircraft, designated Tu-95MSM, were redelivered to the VVS in late 2014 and early 2015 still without the full scope of the MLU, e.g., radar. Plans call for the upgrade of 20 additional airframes by 2016. The fleet was adapted in the early 2000s to carry the conventional Kh-555 ALCM, and approximately half of the fleet is modified to carry 10 additional missiles externally. Aircraft are undergoing mods to enable external carriage of eight Kh-102 extended-range nuclear ALCM (reducing aircraft range to 4,350 miles in this configuration).

Extant Variants:
- Tu-95MS. Latest production version, capable of cruise missile delivery.
- Tu-95MSM. Upgraded aircraft.

Function: Long-range heavy bomber, missile carrier.
Delivered: December 1982–92 (Tu-95MS).
Inventory: 61.
Accommodation: seven.
Dimensions: span 164 ft 2 in, length 161 ft 2 in, height 43 ft 8 in.
Weight: max T-O 407,885 lb.
Ceiling: 34,450 ft.
Performance: speed 516 mph, range 6,524 miles.
Armament: six long-range nuclear Kh-55, or conventional KH-555 ALCMs on internal rotary launcher. Future weapons incl eight nuclear Kh-102 ALCMs.



Tu-160 Blackjack

Tu-160 • NATO reporting name: Blackjack

Brief: Russia's most powerful and modern strategic bomber, externally resembling the B-1B Lancer. The Tu-160's blended fuselage/wing center section maximizes radar deflection for low observability. Its widely spaced engines allow for two tandem weapon bays. The variable-geometry wing is manually selected between 20° for T-O and landing, 35° for Mach 0.77 speed, and 65° for supersonic flight. The first 19 Tu-160s were initially deployed to Pryluky AB, Ukraine, where they remained after the collapse of the USSR. Russia bought eight aircraft back from Ukraine in 1999 and restored them; the remaining were scrapped, with one placed on display. Tu-160s routinely participate in long-range patrols that have intensified around Europe and in the Pacific. Upgrades initiated in 2011 added the new Kh-102 missile. MLU aircraft are designated Tu-160M, incorporating new radar, navigation and communications systems, and ECM. The initial phase, excluding radar replacement, was delivered to the Russian air force in 2014. Five additional airframes are slated for upgrade in 2015. The Russian government recently announced the intent to restart Tu-160M2 production with a potential order for up to 50 airframes to bridge the gap to the planned next generation PAK-DA bomber.

Extant Variants:
- Tu-160. Basic production variant.
- Tu-160M. Upgraded aircraft.

Function: Supersonic long-range heavy bomber.

Delivered: April 1987–April 2008.
Inventory: 16.
Accommodation: four.
Dimensions: span 116 ft 10 in swept to 182 ft 9 in spread, length 177 ft 6 in, height 44 ft.
Weight: max T-O 606,270 lb.
Ceiling: 51,181 ft.
Performance: max speed 1,243 mph or 640 mph at S-L, cruise Mach 0.77, range 7,643 miles with six missiles dropped midrange.
Armament: standard six (max 12) conventional Kh-555 and nuclear Kh-55SM, or modern nuclear Kh-102 cruise missiles internally. Reportedly adapted to carry the standoff 3,300-lb UPAB-1500 bomb.

TACTICAL COMBAT AIRCRAFT



MiG-29 Fulcrum

MiG-29 • NATO reporting name: Fulcrum

Brief: Lightweight fighter aircraft. The MiG-29 was the first Soviet fighter exhibited to the Western public at the Farnborough air show in 1988, as part of Gorbachev's rapprochement with the West. The initial 1971 heavy fighter design was split between what became the lightweight MiG-29 and Sukhoi's heavier Su-27. The MiG-29 was produced in high numbers for the Soviet air force and export customers, with production peaking in 1988, when 228 single-seat and 50 two-seat examples rolled off the line. Due to its limited range, the Russian air force elected to forgo an MLU program, in favor of the Sukhoi Flanker. The VVS received 28 new-build MiG-29SMTs (plus six two-seat trainers) in 2009, after they were rejected by Algeria. The multirole SMT variant incorporates increased fuel capacity and modern digital fire-control, as well as upgraded IRST and HMS and new air-to-ground weapons. A second batch of 16 new-build fighters was ordered in 2014, for delivery by 2016. The navalized MiG-29K was developed as a carrier-capable variant for the Indian navy, with the SMT's fire-control systems, and was first delivered in 2009. The VMF ordered 24 in 2012, designating the single-seat variant MiG-29KR and two-seat variant MiG-29KUBR, for operations aboard the carrier *Admiral Kuznetsov*. Russia is testing two land-based types derived from the MiG-29K, dubbed MiG-29M and MiG-35. The MiG-35 incorporates AESA radar and uprated RD-33MKR turbofans.
Extant Variants:
• MiG-29. Standard version delivered through 1991.
• MiG-29UB. Non-radar-equipped, two-seat combat trainer.
• MiG-29SMT. Modernized multirole version.
• MiG-29KR. Single-seat, carrier-capable fighter.
• MiG-29KUBR. Two-seat training version of the MiG-29KR.
• MiG-29M. Shore-based fighter lacking carrier-specific equipment.
• MiG-35. Developmental variant with AESA radar and improved engines.
Function: Multirole fighter.
Delivered: from July 1983.
Inventory: approx 150 (VVS), 14 (VMF).
Accommodation: pilot.
Dimensions: span 37.3 ft, length 56.9 ft, height 15.5 ft.
Weight: T-O clean 33,731 lb (MiG-29SMT: 37,479 lb), max T-O 43,431 lb (MiG-29SMT: 48,502 lb).
Ceiling: 57,400 ft.
Performance: speed 1,491 mph, 932 mph at S-L, range 932 miles (MiG-29SMT: 1,118 miles), ferry range 1,305 miles (MiG-29SMT: 1,864 miles).
Armament: one internal 30 mm cannon (150 rd), two medium-range R-27 (AA-10 Alamo), and four short-range R-73 (AA-11 Archer) air-to-air missiles (air-to-air loadout) or combat mix of general-purpose bombs, CBUs, and unguided rockets (air-to-ground loadout). MiG-29SMT: six RVV-AE air-to-air missiles (air-to-air loadout) or four Kh-25M, or two Kh-29T/L, or two Kh-31A/P, or four KAB-500 missiles (air-to-ground loadout).

MiG-31• NATO reporting name: Foxhound

Brief: Long-range, supercruise-capable interceptor. The MiG-31 was the world's first PESA-equipped fighter, designed in 1968 to replace the MiG-25. The aircraft is designed for autonomous intercept without GCI support, mainly employed in Russia's northern regions against cruise missile attack. The aircraft retains its predecessors' Mach 2.35 cruise performance, adding the all-altitude multitarget capability of the Zaslon PESA and longer endurance. Despite design capabilities, speed is reportedly limited to Mach 1.5 due to canopy material limitations. Aircraft data links allow networking between aircraft and to AOCs. The upgraded MiG-31BM that has been ordered adds improved PESA radar and new weapons, and more than 50 have been upgraded to date. The upgraded Zaslon-AM radar reputedly doubles the aircraft's detection range to 149 miles, and mods replaced the systems operator's dated displays with LCD screens in the aft cockpit. New weaponry include four 124-mile-range R-37M air-to-air missiles and four close air combat R-73 missiles.
Extant Variants:
• MiG-31B. Standard late production variant with Zaslon-A radar.
• MiG-31BS. Upgraded MiG-31B.
• MiG-31BM. Current upgraded aircraft with Zaslon-AM radar and new missiles.
Function: Long-range interceptor.
Delivered: February 1981–94.
Inventory: about 120.
Accommodation: pilot (front) and WSO (rear).
Dimensions: span 44.2 ft, length 74.4 ft, height 20.1 ft.
Weight: max T-O 101,853 lb.
Ceiling: 67,585 ft.
Performance: max speed Mach 2.83; speed Mach 2.35 for new aircraft (currently limited to Mach 1.5). Range 2,050 miles with two external tanks.
Armament: one internal six-barrel 23 mm cannon (260 rd), four R-33 or nuclear R-33S air-to-air missiles, two medium-range R-40TD, or four self-defense R-60M air-to-air missiles on the wing pylons.



MiG-31 Foxhound

Su-24M • NATO reporting name: Fencer-D

Brief: Variable-geometry nuclear and conventional strike aircraft designed for low-level penetration. The Su-24 was designed in the 1960s as a counterpart to the Air Force's F-111. The basic Su-24M is equipped with a large dual-band FCR, laser/TV targeting, and terrain-following radar. The fleet is undergoing low-cost upgrades through 2020. Upgraded aircraft are designated Su-24M SVP-24 and incorporate more accurate navigation and fire-control systems. Roughly 50 aircraft have undergone mods to date. The Su-24M2 is an MLU version with a new manufacturer-supplied navigation and fire-control system, improved radar, modern INS and satnav systems, and reportedly, the new podded KS-418 jammer. Thirty airframes were upgraded between 2007 and 2009. The Su-24 is due to be replaced by the Su-34.
Extant Variants:
• Su-24M. Standard bomber version.
• Su-24M (SVP-24). Low-cost contractor upgraded airframe.
• Su-24M2. Manufacturer-upgraded airframe.
• Su-24MR. All-weather, multisensor reconnaissance aircraft.
Function: SEAD, air interdiction.
Delivered: 1973-92.
Inventory: about 260 (incl 30 VMF).
Accommodation: pilot and WSO side-by-side (pilot to port).
Dimensions: span 34 ft swept to 57.9 ft spread, length 80.5 ft, height 20.3 ft.
Weight: max T-O 87,523 lb.
Ceiling: 37,730 ft.
Performance: speed 901 mph max or 746 mph at S-L with weapons, operational radius at S-L 242 miles without or 354 miles with external tanks, ferry range 1,585 miles.
Armament: one six barrel 23 mm cannon (500 rd), two R-60 air-to-air missiles for self-protection, tactical nuclear weapons or various types of free-fall bombs, GBUs, or rockets. AGMs incl two 80-mile range Kh-59M and Kh-58U, or Kh-31P anti-radiation missiles.



Su-25UB Frogfoot-B

Su-25 • NATO reporting name: Frogfoot

Brief: Heavily armored subsonic close air support aircraft. The Su-25 was designed in 1968 as a highly survivable and maneuverable, subsonic CAS platform, analogous to the A-10. The Su-25UTG is a navalized, carrier-capable training aircraft, complete with arresting gear. The standard variant was heavily employed in Afghanistan from 1979 to 1989 and was extensively modified based on lessons learned during the conflict. Su-25s were used in combat in Chechnya and in the invasion of Georgia in 2008. The Su-25SM is an MLU variant with modernized targeting and navigation systems, and approximately 85 airframes have been delivered since 2006. The latest Su-25SM3 adds modernized self-defense and communications equipment.

Extant Variants:

- Su-25. Standard single-seat CAS platform (NATO Frogfoot-A).
- Su-25UB. Two-seat combat trainer (NATO Frogfoot-B).
- Su-25UTG. Shipborne trainer with weapons system removed.
- Su-25SM. Upgraded Frogfoot-A.
- Su-25SM3. Upgraded Frogfoot-A with new self-defense and comm suites.

Function: Attack.
Delivered: 1979-92.
Inventory: approx 200.
Accommodation: pilot.
Dimensions: span 47.1 ft, length 50.9 ft, height 15.8 ft.
Weight: max T-O 38,800 lb (Su-25), 41,890 lb (Su-25SM).
Ceiling: 22,950 ft.
Performance: speed 590 mph, range without external tanks at S-L 317 miles, ferry 1,450 miles.
Armament: one double-barrel 30 mm cannon (250 rd). Combat mix incl various types of free-fall or guided weapons, laser guided or standard rockets, and gunpods on eight underwing pylons, and two R-60 air-to-air missiles on wingtip pylons. Russian air force Su-25 are adapted to carry two tactical nuclear free-fall bombs.

Su-27 • NATO reporting name: Flanker

Brief: Originally designed in 1969 as an air superiority fighter and later adapted as a multirole aircraft, as a counterpart to the US F-15. The Su-27 forms the backbone of Russia's fighter force and is still in limited production for Russian and export customers. The current multirole Su-27SM was developed as a derivative of the Su-30MK2 exported to China. The aircraft incorporates only basic improvements, retaining the legacy Cassegrain radar.

Extant Variants:

- Su-27. Standard operational model (NATO Flanker-B).
- Su-27UB. Two-seat combat-capable trainer (NATO Flanker-C).
- Su-27SM. Upgraded aircraft with air-to ground capability (50+ modified).
- Su-27SM(3). New-build and upgraded aircraft with improved avionics.

Function: Air superiority, multirole fighter.
Delivered: from 1982.
Inventory: approx 200 (approx 70 multirole Su-27SM).
Accommodation: pilot.
Dimensions: span 48.2 ft, length without probe 72 ft, height 19.5 ft.
Weight: empty 36,112 lb, standard T-O 51,654 lb, max T-O 62,391 lb.
Ceiling: 60,700 ft.
Performance: max speed 1,491 mph, 870 mph at S-L, max operational range 2,193 miles, 833 miles at S-L.
Armament: one internal 30 mm cannon (150 rd); up to 10 air-to-air missiles incl medium-/extended-range R-27/R-27E and short-range R-73, or RVV-AE and R-77-1 (air-to-air loadout); mix of guided AGM incl Kh-31A/P anti-ship/anti-radiation missiles (up to four), Kh-29L missiles (up to four), S-25LD missiles (two), and KAB-500Kr (four), and KAB-1500Kr (one) GBU (air-to-ground loadout).



Su-27 Flanker

Su-30 • NATO reporting name: Flanker

Brief: "Russified" version of export, two-seat multirole designs. Aircraft based on the Su-30MKK exported to China are less advanced, incorporating an upgraded Su-27 fire-control system. The airframe is a considerably strengthened derivative of the two-seat Su-27, to permit higher T-O weights required to carry weapons and a full fuel load. Advanced models derived from the Su-30MKI sold to India add PESA, thrust-vectoring and canard flight controls, and a modern, open-architecture fire-control system. In the Russian air force, the Su-30M2 also serves as the combat trainer for upgraded Su-27SM fighters.

Extant Variants:

- Su-30M2. VVS airframes based on Chinese-export version.
- Su-30SM. VVS and VMF airframes based on Indian-export version.

Function: Two-seat multirole fighter.
Delivered: from 2010.
Inventory: 53 (92 ordered).
Accommodation: two pilots in tandem.
Dimensions: span 48.2 ft, length 72 ft without probe, height 21 ft.
Weight: max T-O 76,060 lb, max allowable T-O 83,776 lb.
Ceiling: 56,759 ft.
Performance: speed Mach 2.0, speed 839 mph at S-L, range 1,864 miles.
Armament: one 30 mm cannon (150 rd), up to 17,640 lb on 12 pylons incl R-27, RVV-AE and R-73 air-to-air missiles (air-to-air loadout); Kh-59M, Kh-31P/A, and Kh-29 missiles (air-to-ground loadout).

Su-33 • NATO reporting name: Flanker-D

Brief: Carrier-based air superiority and fleet-defense fighter deployed aboard the Russian navy's sole large-deck carrier, *Admiral Kuznetsov*. Developed under the designation Su-27K, the Su-33 is equipped with canards and large flaperons to decrease its angle of attack during carrier T-Os and landings. The aircraft is also fitted with reinforced landing gear and an arresting hook for deck operations. The Su-33 uses the Su-27's fire-control system with slight modifications for overwater operations and has an optional manual/automatic landing approach system.

Function: Carrier-borne air superiority, fleet defense.
Delivered: 1993-96.
Inventory: 21.
Accommodation: pilot.
Dimensions: span 48.2 ft, span at stowage (wings and tailplane folded) 24.3 ft, length 69.5 ft without probe, height 18.8 ft.
Weight: max T-O 55,116 lb, max allowable T-O 72,752 lb.
Ceiling: 55,775 ft.
Performance: max speed Mach 2.17, speed 808 mph at S-L, range 1,864 miles.
Armament: one single-barrel 30 mm GSh-30-1 cannon, up to 14,330 lb on 12 pylons incl R-27/R-27E and R-73 air-to-air missiles.



Su-34 Fullback

Su-34 • NATO reporting name: Fullback

Brief: Tactical bomber derived from the Su-27 fighter, as a replacement for the Su-24M. The aircraft boasts a 30 to 50 percent range improvement over the Su-24 and is equipped with modern targeting and navigations systems that are compatible with the latest generation of weapons. The Su-34 is primarily tasked with tactical interdiction/penetrating strike and is capable of hitting targets with 8,800 lb of weapons at up to a 500-mile range. It incorporates a low-signature X-band PESA radar capable of engaging four simultaneous surface targets. Two development aircraft saw combat during the 2008 invasion of Georgia, destroying an air defense radar site with an anti-radiation missile. It carries podded SLAR, TV camera, linear IR, and Sigint payloads in the reconnaissance role, and data are transmittable to ground stations via real-time wideband data link. The aircraft is fitted with the powerful L175/L265 Khibiny/-M ECM suite, complemented by external ECM pods.

Function: Strike, SEAD, reconnaissance, EW.
Delivered: since December 2006.

Production: 61 (129 ordered), plus eight prototypes.
Inventory: 61.
Accommodation: one pilot, one WSO side-by-side.
Dimensions: span 48.2 ft, length without probe 76.6 ft, height 20 ft.
Weight: max T-O 99,430 lb.
Ceiling: 51,510 ft.
Performance: max speed Mach 1.6, speed at S-L 808 mph, range at S-L with weapons 1,087 miles, ferry range 2,485 miles.
Armament: one 30 mm cannon (150 rd), full range of Russian tactical nuclear and conventional air-to-ground munitions. Air-to-air weapons incl beyond visual range R-27 and close air combat R-73 missiles. Typical configurations incl six Kh-31s, two Kh-59Ms, five Kh-59MKs, three 3,300-lb bombs, or 32 x 550-lb bombs.

Su-35 • NATO reporting name: Flanker

Brief: The most modern development of the Flanker, the Su-35 is intended as a lower-cost complement to Russia's fifth generation T-50 PAK-FA, along with the upgraded Su-30SM/M2 fleets. Though externally similar to the Su-27, the aircraft has shorter vertical stabilizers and tail "stinger" and lacks its predecessor's airbrake, deflecting its rudders instead for aerodynamic braking. The Su-35's revised structure incorporates new materials. Its fully integrated targeting and navigation system links its advanced PESA radar and IRST, ECM suite, and HMS through a central computer. The Su-35's powerful Irbis (Snow Leopard) radar is reputedly capable of fixing and tracking air targets at up to 249 miles at peak power. The aircraft is the first Russian fighter to employ an ultraviolet missile-warning system.
Extant Variant:
• Su-35S. Standard production version for VVS.
Function: Heavy long-range multirole fighter.
Delivered: since February 2014.
Inventory: 34.
Accommodation: pilot.
Dimensions: span 48.2 ft, length 71.9 ft, height: 19.4 ft.
Weight: max T-O 76,059 lb.
Ceiling: 59,055 ft.
Performance: max Mach 2.25, speed at S-L 870 mph, range 2,237 miles clean, 2,976 miles with external tanks.
Armament: full spectrum of current and developmental Russian tactical missiles.


T-50

T-50

Brief: Fifth generation, multirole aircraft designed to replace the Su-27 as the Russian air force's dominant fighter. The T-50 is being developed under the PAK-FA (Future Air Complex of Tactical Aviation program) begun in the late 1990s. The T-50 features low observable characteristics, supercruise, advanced sensor fusion, and high maneuverability, making it a nominal counterpart to the F-22. The manufacturer claims the T-50's radar cross section is equal to three or four square feet, compared to the Su-27's 160-square-foot radar signature, owing mostly to internal weapons carriage. The aircraft's Byelka (Squirrel) AESA radar, ECM, and Atoll EO suite, in addition to its navigation, communications, and data links, are tied to a central computer. IOC and full rate production are currently, and unrealistically, slated for the end of 2016. Since the prototype's first flight in 2010, the type has logged only 600 test flights. Russia is cooperating with India to develop a two-seat export version for the Indian Air Force, under India's Fifth Generation Fighter Aircraft (FGFA) program.
Function: Fifth generation multirole fighter.
Delivered: none.
Inventory: none operational.
Accommodation: pilot.
Dimensions, estimated: span 46 ft, length 65 ft, height 15 ft.
Weight, estimated: nominal T-O 55,000 lb; max T-O 75,000 lb.
Ceiling, estimated: 60 000 ft.
Performance, estimated: max Mach 2.0, cruise Mach 1.3, supersonic range 950 miles; max range 2,200 miles.
Armament: one single-barrel 30 mm cannon; up to four medium-range K-77M or long-range "810" air-to-air missiles, Kh-58UShK or Kh-36 anti-radiation missiles, and Kh-38M or KAB-250 EO air-to-ground munitions in two internal fuselage weapons bays. Two K-74M2 close air combat air-to-air missiles in underwing bays. Underwing stores can be fitted for nonstealthy missions.

RECONNAISSANCE AND SURVEILLANCE AIRCRAFT


A-50U Mainstay

A-50 • NATO reporting name: Mainstay

Brief: Russia's sole airborne early warning aircraft, converted from Ilyushin Il-76MD Candid airlifter, with a radar housed in a rotodome above the fuselage. Its Shmel (Bumblebee) radar is reputedly capable of detecting and tracking targets at up to 143 miles in look-down mode, or up to 217 miles operating from high altitude. Mainstay can track up to 45 targets and vector 12 fighters simultaneously to intercept. The first MLU aircraft was redelivered to the Russian air force in 2011 and redesignated A-50U. Three operational and one prototype aircraft were upgraded; upgrade of next batch was ordered in 2014. MLU airframes received new computers with more reliable, digital signal processing and modern LCD operator stations, as well as new navigation and comms. The only external difference between A-50 and A-50U is the absence of fins that shielded the legacy platform from signal reflections. Contractor Beriev is developing a next generation AWACS based on the more modern Il-76MD-90A version of the airlifter. The prototype A-100 entered conversion in late 2014. The type is slated for IOC by late 2017.
Extant Variants:
• A-50. Standard operational version.
• A-50U. Upgraded airframe with improved radar.
Function: Early warning, C2.
Delivered: 1985-93.
Inventory: 15+.
Accommodation: flight crew: five; mission crew: 10.
Dimensions: span 165.7 ft, length 158.4 ft incl refueling probe, height 48.4 ft.
Weight: max T-O 418,878 lb.
Ceiling: 40,000 ft.
Performance: max speed 503 mph, patrol speed 373 mph, range 3,170 miles, patrol duration four hours at 621 miles from base.

An-30 • NATO reporting name: Clank

Brief: Surveillance aircraft derived from the turboprop Antonov An-24 commuter airliner and used for arms control treaty verification and imagery collection permitted under the 1992 Open Skies treaty. The type's forward fuselage is modified with a raised cockpit and glazed nose for observation purposes. The An-30B primarily conducts Open Skies flights over European signatory countries, using the AFA-41/10 (100 mm) and AFA-41/20 (200 mm) photo cameras. Aircraft used within Russia have a wider camera selection.
Extant Variant:
• An-30B. Civilian An-30A with gyro-stabilized camera platform.
Function: Observation.
Delivered: 1971-80.
Inventory: 15+.
Accommodation: aircrew: five; two camera operators.
Dimensions: span 95.8 ft, length 79.6 ft, height 27.3 ft.
Weight: max T-O 50,706 lb.
Ceiling: 27,230 ft.
Performance: speed 336 mph, cruising speed 267 to 295 mph, max range 1,634 miles.

Il-20 • NATO reporting name: Coot-A

Brief: Radar reconnaissance and Elint aircraft based on Ilyushin Il-18D airliner. The primary sensor is the Igla (Needle) Ku-band SLAR, housed in a 21-foot cigar-shaped fairing under the fuselage, housing the high-resolution radar antenna. An upgraded Il-20MS version is under development, after which, plans call for the majority, if not the entire fleet, to be upgraded. Il-20MS aircraft retain the Igla SLAR, paired with a more modern computer, a new Elint payload, and new self-defensive suite including UV missile warning, and decoy systems. The separate Il-20RT version is used by Russia's strategic RVSN as a tracking and signal relay/translator platform for national security space and ICBM launches. The SLAR pod is removed and replaced with a longer canoe fairing atop the fuselage. A single aircraft designated Il-20M Anagramma was modified in 2004 with a large box-shaped antenna, housing an unknown electronic sensor. Another aircraft dubbed Monitor was modified in 2009 with large cylindrical antennas, an underslung radar, and a forward EO/IR turret.

Extant Variants:
• Il-20M. Standard SLAR/Elint equipped variant.
• Il-20RT. Missile tracking and relay variant.
• Il-20M. Anagramma airframe, payload unknown.
• Il-20M. Monitor airframe, payload unknown.
• Il-20MS. Upgraded Il-20M, in development.
Function: Electronic reconnaissance.
Delivered: 1969-76.
Inventory: approx 12.
Accommodation: flight crew: five; tactical crew: six.
Dimensions: span 122.8 ft, length 117.8 ft, height 33.4 ft.
Weight: max T-O 141,056 lb.
Ceiling: 32,800 ft.
Performance: speed 373 mph, range 3,728 miles.



Il-20 Coot-A

Ka-31, Ka-35 • NATO reporting name: Helix

Brief: Airborne early warning and battlefield surveillance helicopters. The Ka-31 serves the navy, acting as an airborne picket, detecting air and sea-surface threats, while the Ka-35 is used by the army, designed for battlefield surveillance. Both helicopters are based on the Ka-27 ASW helicopter, with fuselage modifications to house their specialized mission equipment. The Ka-31 is equipped with the Oko (Eye) pulse-Doppler L-band radar, which utilizes a large, rotating, rectangular antenna. The radar employs passive electronic scanning, for establishing elevation, and mechanical scanning to track a target's azimuth. The army Ka-35 version is in development and is optimized for land-based surveillance, including a potent self-defensive suite. Both helicopters deploy a stowable antenna that folds flush with the underfuselage during transit. The helicopter's quad landing gear are hydraulically raised when the antenna is in operation, to avoid electromagnetic interference. Signals are relayed to ship or shore-based command posts for processing.
Extant Variants:
• Ka-31. Production version delivered for export.
• Ka-31R. Naval derivative for the VMF.
• Ka-35. Battlefield surveillance derivative.
Function: Radar picket helicopter.
Delivered: 2003-12 for India and China; since 2012 to the VMF.
Inventory: two of 12 expected by 2020 (Ka-31R, VMF).
Accommodation: two, one pilot, one navigator/systems operator.
Dimensions: rotor diameter 52.2 ft each, fuselage length 37.1 ft, height 18.5 ft.
Weight: max T-O 27,558 lb.
Ceiling: operational, up to 11,500 ft.
Performance: max speed 155 mph, operating speed 62-68 mph, range 373 miles.



Ka-31 Helix

Photo by Piotr Butowski

Su-24MR • NATO reporting name: Fencer-E. (See Su-24M.)

Tu-154M-LK1 • NATO reporting name: Careless. (See Tu-154.)

Tu-214-ON

Brief: Surveillance version of Tu-214 airliner used for longer-range arms control verification flights permitted under the 1992 Open Skies treaty. The aircraft is equipped with synthetic aperture Ronsar SLAR, dual-band Raduga IR scanner, and a photographic suite including vertical, panoramic, and oblique cameras, in addition to one vertical and two oblique video cameras. The SLAR operates at 8.6 GHz frequencies giving it a 30-mile range and 10-foot resolution over land, and 125-mile range and 20- to 25-foot resolution at sea. Russia operates the most advanced Open Skies treaty surveillance platform of the 34 states, including the US, that are party to the treaty. The Tu-214ON is the only Open Skies verification aircraft equipped with the full capabilities permitted under the treaty.
Function: Observation.
Delivered: 2014.
Inventory: two.
Accommodation: aircrew: three; multiple mission crew.
Dimensions: span 137.1 ft, length 151.4 ft, height 45.6 ft.
Weight: max T-O 244,162 lb.
Ceiling: 40,000 ft.
Performance: speed 528 mph, range 4,000 miles.

Tu-214R

Brief: Multisensor reconnaissance platform based on the Tu-214 twin-jet airliner by Russia's military intelligence (GRU) to supplement the smaller Il-20 Coot-A. The aircraft's primary sensor is the MRK-411 radar. The full array consists of flat SLAR antennas on the forward fuselage and an omnidirectional surveillance radar in a radome under the aft fuselage. The system operates in X, L, and VHF wave bands. A cigar-shaped fairing under the forward fuselage houses a high-definition EO turret. The aircraft is also equipped with a Sigint payload and self-defensive suite.
Function: Electronic reconnaissance.
Delivered: 2015.
Inventory: two are still in tests and are to be delivered in 2015.
Dimensions: span 137.1 ft, length 151.4 ft, height 45.6 ft.
Weight: max T-O 244,162 lb.
Ceiling: 40,000 ft.
Performance: approx speed 500 mph, range 5,000 miles.

SPECIAL MISSION AIRCRAFT


A-60

Beriev photo

A-60

Brief: Airborne laser intended to jam enemy EO reconnaissance systems, mounted on a modified Il-76MD airlifter. The A-60 project was initially devised for downing NATO high-altitude balloons, which Soviet military authorities believed carried reconnaissance sensors. Fighters and anti-aircraft missiles were deemed ineffective against the threat, leading to the development of the A-60, equipped with a cargo bay-mounted high-energy laser gun. The aircraft's spine fairing houses the mirror system to direct the beam, guided by the aircraft's Ladoga fire-control radar. The first weapon had a 25-mile range and managed to hit and damage a balloon during tests in 1984. Trials were suspended after the fall of the Soviet Union, but resumed in 2003, aimed at "blinding" adversary space-based surveillance systems, which are often used to track, characterize, and measure launches and orbital vehicles. The A-60 succeeded in firing on a Japanese Ajisai satellite orbiting at an altitude of 930 miles on Aug. 18, 2009, registering a signal return. Russia is developing the new 1LK222 carbon-monoxide laser and intends to test it aboard the restored A-60 prototype in 2015, later fitting it to a new-build Il-76MD-90A—designated A-60M—intended as an operational weapon.
Extant Variants:
• A-60. Experimental laser-weapon platform.
• A-60M. Next generation laser weapon mounted on a new Il-76MD-90A airframe.
Function: Airborne laser weapon.
Delivered: none.
Inventory: one (development aircraft).
Accommodation: unknown.
Dimensions: span 165.7 ft, length 152.9 ft, height 48.4 ft.
Weight: max T-O 420,000 lb.
Ceiling: operational 33,000 ft.
Performance: approx speed 460 mph, range 3,000 miles.



Il-22 Coot-B

Il-22 • NATO reporting name: Coot-B

Brief: Theater-level airborne command post and relay aircraft based on the Ilyushin Il-18D turboprop airliner. The Il-22 is identifiable by its bullet-shaped tailfin cap and a shallow 66-foot-long, underfuselage pod (30 ft on Il-22M). A single airframe, registered RA-75903, was converted as a developmental Sigint and standoff jamming platform designated Il-22PP. The PP variant features four bulbous ECM fairings on the sides and rear of the fuselage. The fixed underfuselage pod houses a self-defensive chaff/flare system. Testing was completed at Akhtubinsk test center in 2014, and plans call for three aircraft (including the prototype) to be converted as EW platforms. The aircraft's EW suite is also slated to equip a larger, more modern Tu-214-based EW platform (dubbed Tu-214PP) scheduled to fly in 2018.

Extant Variants:

- Il-22 Bison. Airborne command post version.
- Il-22M Zebra. Radio-relay version (most converted to Il-22M11-RT Sokol).
- Il-22M11-RT Sokol. Upgraded version of the Il-22M with Sokol relay system.
- Il-22K. Single airframe equipped with Sokol-K radio relay system.
- Il-22PP. Developmental Sigint and EW platform.

Function: Command and control, signal relay, EW.
Delivered: 1976-85.
Inventory: 15+.
Accommodation: flight crew: five; mission crew: at least six.
Dimensions: span 122.8 ft, length 117.8 ft, height 33.4 ft.
Weight: max T-O 140,000 lb.
Ceiling: 33,000 ft.
Performance: speed 373 mph, range 3,850 miles, endurance 10 hours.



An Il-80 Maxdome with a pair of MiG-29s

Photo by Piotr Butowski

Il-80 • NATO reporting name: Maxdome

Brief: Strategic airborne command post similar to the Air Force's E-4B National Airborne Operations Center, converted from the Il-86 wide-body airliner. The Il-80 is a part of a command system of the Russian nuclear forces, which reports to the General Staff of the Russian Armed Forces. Maxdome has an advanced comms suite developed by Polyot and is easily identifiable by its Satcom hump on the upper, forward fuselage. The aircraft is equipped with VLF and trailing wire antenna for communications with submerged ballistic missile submarines. At least two of the four aircraft were modernized for compatibility with the Zveno-2S command and control network.
Function: National airborne command post.
Delivered: 1987-90.
Inventory: four (two likely airworthy).
Accommodation: flight crew: four; operational crew: numerous.
Dimensions: span 157.7 ft, length 195.3 ft, height 51.9 ft.
Weight: max T-O 474,000 lb.
Ceiling: 36,000 ft.
Performance: speed 528 mph, range in excess of 4,350 miles.

Il-82

Brief: Relay aircraft to augment Russia's Il-80 Maxdome airborne command posts, converted from Il-76 airlifter. The Il-82 features a prominent Satcom hump on the forward fuselage (similar to Maxdome), as well as VLF and a trailing wire antenna for communication with submerged ballistic missile submarines. The Il-82 lacks the transparent nose glazing of the standard airlifter and features a number of additional antenna aerials along the fuselage. Beriev upgraded at least one aircraft in 2008. The Il-82's effective combat radius is unknown.
Function: Relay aircraft.
Delivered: 1987.
Inventory: two (one likely airworthy).
Accommodation: aircrew: five; mission crew: unknown.
Dimensions: span 165.7 ft, length 152.9 ft, height 48.4 ft.
Weight: max T-O 418,878 lb.
Ceiling: approx 39,000 ft.
Performance: approx speed 470 mph, range 3,500 miles.

Mi-8 ECM variants • NATO reporting name: Hip-J, Hip-K. (See Mi-8.)

Tu-142MR • NATO reporting name: Bear-J. (See Tu-142.)

ATTACK AND TRANSPORT HELICOPTERS

Ka-29 • NATO reporting name: Helix-B

Brief: Ship-based helicopter for air assault, transport, and marines' CAS. The Ka-29 is developed from the Ka-27 ASW helicopter and features a new cabin fuselage to accommodate 12 troops. The platform is capable of firing Shturm-V anti-tank missiles, equipped with chaff/flare, and some carry the L-166V (NATO Hot Brick) IR jammer. The cockpit and engines are fitted with armor plating and foam fuel-tank inerting. Helicopters are deployed individually aboard ships, and many near-new airframes are currently in storage.
Function: Attack, assault, and transport helicopter.
Delivered: 1984-93.
Inventory: unknown.
Accommodation: pilot and weapon systems officer, side-by-side.
Dimensions: rotor diameter 52.2 ft, fuselage length 37.1 ft, height 17.9 ft.
Weight: combat T-O 24,471 lb, max T-O 25,353 lb.
Ceiling: 14,100 ft.
Performance: max speed 180 mph, speed 146 mph, range 286 miles with 16 troops.
Armament: eight 9M114 (NATO: AT-6 Spiral) tube-launched anti-tank guided missiles, unguided rockets, gun packs, bombs. Optionally, 2A42 30 mm single-barrel cannon (250 rd) on port weapon rack.



Ka-52 Hokum-B

Ka-52 • NATO reporting name: Hokum-B

Brief: Scout-attack helicopter with coaxial, contrarotating rotors and ejection seats. The helicopter's Ka-band radar is used for targeting, navigation, and reconnaissance tasks, featuring a 15-mile effective range against large structures, and up to nine miles against vehicle targets. The radar's wide 2.6-foot radar array is facilitated by the helicopter's unique side-by-side crew arrangement. The aircraft's EO turret houses thermal imaging camera, TV camera, laser rangefinder/designator for guided missiles, and laser spot tracker. The Ka-52's powerful self-defensive suite combines radar, laser, and UV-warning sensors, IR jamming, and chaff/flare. The Ka-52K Katran (Spiny Dogfish) is a developmental, navalized version for use on the yet-to-be delivered, French-built Mistral class amphibious assault ships. Katran features shorter, folding wings and folding rotor blades, strengthened undercarriage, modified radar, new EO turret, and anti-ship weapons including the Kh-35UV missile.

Extant Variants:

- Ka-50. Black Shark. Early single-seat version (NATO Hokum).
- Ka-52. Alligator. Production sensor-equipped two-seater (NATO Hokum-B).
- Ka-52K. Katran. Developmental ship-based variant.

Function: Scout, attack.
Delivered: 1991-93 (Ka-50s), and then since 2010 (Ka-52s).
Inventory: six Ka-50s, 75+ Ka-52s.
Accommodation: two pilots side-by-side.
Dimensions: rotor diameter 47.6 ft, fuselage length 45.5 ft, height 16.6 ft.
Weight: combat T-O 23,810 lb with six ATGMs, max T-O 26,896 lb.
Ceiling: 18,000 ft.
Performance: max speed 186 mph, speed 162 mph, combat range 286 miles, ferry range 690 miles.
Armament: one 30 mm cannon (460 rd), six to 12 laser guided Ataka-1 or Vikhr-1 (NATO AT-16 Scallion) anti-tank missiles, or radio guided Ataka missiles. Up to four rocket launchers. Four Igla (NATO SA-18 Grouse) portable SAMs.



An Mi-26 Halo with a pair of Mi-8 Hips

Mi-8 • NATO reporting name: Hip

Brief: World's second most common utility helicopter, after the lighter Bell UH-1 Huey, and continuously produced for 50 years. All Russian military Hips are designated Mi-8 and differentiated by suffixes, while export models are designated Mi-17, Mi-171, or Mi-172 (depending on manufacturer.) The Russian defense ministry resumed large-scale purchases after a 15-year break in 2008, ordering more than 300 new-build Mi-8s. Approximately 100 other countries operate Mi-8 variants, mostly in military applications. The newest production version Mi-8MTV-5 features a wider port cabin door, additional starboard cabin door, single-piece rear ramp and restyled nose. Mi-17V-5 is its export equivalent. The US purchased 63 of the newest version for the Afghan National Army Air Corps, the last delivered in 2014. Several special operations versions were developed for counterinsurgency operations, notably in Chechnya and the Northern Caucasus, featuring EO sensors and weapons. The most advanced Mi-8MNP uses the same sensors and armaments as the Mi-35M attack helicopter. Several standoff jamming variants have been produced since the 1980s. The latest and current production model Mi-8MTPR-1 is equipped with the L187A Rychag-AV jammer for use against air defense radars, as well as flares for self-defense.

Extant Variants:

- Mi-8MT. Standard mass-produced version (NATO Hip-H).
- Mi-8MTV. Mi-8MT with uprated engines for better hot/high performance.
- Mi-8AMT. Mi-8MTV equivalent manufactured at Kazan plant.
- Mi-8MTV-5. Current production version.
- Mi-8AMTSh. Alternately manufactured MTV-5 equivalent.
- Mi-8AMTSh-V. Current production version with uprated engines and new avionics.
- Mi-8MNP. SOF version optimized for COIN.
- Mi-8PPA. Early 1980s standoff jamming variant (NATO Hip-K).
- Mi-8SMV-PG. Second jamming variant equipped with SPS-88PG Smalta-PG. (NATO Hip-J).
- Mi-8MTPR-1. Latest standoff jamming variant.

Function: Combat utility, special operations, EW.
Delivered: from 1965.
Inventory: 550+.
Accommodation: crew: three; standard 24 troops (max 36); 12 litters in medevac role; max cargo 8,818 lb (Mi-8MTV-5).
Dimensions: rotor diameter: 69.9 ft, length with rotors turning 83.2 ft, height 15.6 ft to above rotor head, cabin length 17.5 ft, cabin width 7.7 ft, cabin height 5.9 ft.
Weight: standard T-O 24,471 lb, max T-O 28,660 lb.
Ceiling: 19,685 ft.
Performance: max speed 155 mph, speed 137-143 mph, range 425 miles, ferry range 684 miles (Mi-8MTV-5).
Armament: four 80 mm rocket pods (20 rd), gun pods, CBUs, etc. Provision for three cabin-mounted machine guns (Mi-8MTV-5). Special mission versions carry heavier armament, incl anti-armor missiles.

Mi-24, Mi-35M • NATO reporting name: Hind

Brief: Heavy attack helicopter with secondary air assault and CSAR roles, operated by more than 50 countries. The Mi-24 initially saw combat in Afghanistan and was refined through combat experience there from 1979 to 1989, with structural improvements and new equipment and weapons. All variants since the Mi-24D have incorporated its reprofiled fuselage and separate, tandem cockpits for the pilot and weapons operator. The follow-on Mi-24V introduced the Shturm-V anti-tank missile and other weapons and uprated engines for improved hot and high-altitude performance. The Mi-24P replaced the helicopter's flexible machine gun with a fixed 30 mm cannon. The Mi-24VP similarly replaced earlier weapons with a flex-mounted 23 mm cannon. Production of the most advanced Mi-35M variant for the Russian air force and export launched in 2006. Mi-24s have seen combat since the fall of the Soviet Union in Chechnya, Dagestan, Georgia, and other post-Soviet states, as well as the invasion and seizure of Crimea in 2014.

Extant Variants:

- Mi-24D. Reprofiled early version (export Mi-25; NATO Hind-D).
- Mi-24V. Improved version with uprated engines and new weapons (NATO Hind-E).
- Mi-24P. Improved cannon-armed version (export Mi-35P; NATO Hind-F).
- Mi-24VP. Mi-24V with a nose-mounted 23 mm cannon (NATO Hind-E).
- Mi-24R. Nuclear, biological, and chemical sampling version (NATO Hind-G1).
- Mi-24K. Scout/spotter version (NATO Hind-G2).
- Mi-24PN. Upgraded Mi-24P with basic night-mission capability.
- Mi-35M. Current production version.

Function: Attack, air assault, CSAR.
Inventory: approx 150 (Mi-24); 49 (Mi-35M).
Accommodation: pilot, weapons operator, flight engineer.
Dimensions: rotor diameter 56.4 ft, length (with rotors) 70 ft, fuselage length 57.5 ft, height 14.6 ft to above rotor head, wing span 16.6 ft.
Weight: combat T-O 24,030 lb, max T-O 26,015 lb (Mi-35M).
Ceiling: 17,717 ft.
Performance: max speed 186 mph, speed 149 mph, combat range 342 miles, ferry range 621 miles (Mi-35M).
Armament: one twin-barreled 23 mm GSh-23V cannon (450 rd) in undernose turret, eight (max 16) 9M120 Ataka anti-tank missiles, and four 9M39 Igla-V anti-aircraft missiles. Alternatively, 122 mm and 80 mm unguided rockets, CBUs, gun packs.

Mi-26 • NATO reporting name: Halo

Brief: World's largest heavy-lift helicopter, produced nearly unaltered for 30 years. Due to its massive size the Mi-26 requires rigorous maintenance and overhaul. Gearbox and transmission lives are limited to 3,000 hours, while rotor blades are limited to approximately 1,000 hours, and its obsolete engines require overhaul after 600 hours. A civil-contract Mi-26 successfully recovered a downed US Army CH-47 Chinook from 9,200-foot mountain elevation in Afghanistan, carrying the 24,000-lb load 100 miles to Bagram Airfield. Russia began production of the upgraded Mi-26T2 in 2014 for export to Algeria. Upgrades include a reduced, two-man aircrew, glass cockpit, and new navigation systems.

Function: Heavy lift.
Delivered: 1982-present.
Inventory: approx 40.
Accommodation: aircrew: four; 68 paratroops or 82 troops; 61 litters, three attendants in medevac role. Alternative loads are up to 44,092 lb of vehicles, containers, or pallets.
Dimensions: rotor diameter 105 ft, length (with rotors) 131.3 ft, fuselage length 110.7 ft, height 26.7 ft, cabin length 49.2 ft incl ramp, cabin width 10.7 ft.
Weight: max T-O 123,459 lb.
Ceiling: 15,090 ft.
Performance: max speed 183 mph, speed 158 mph, range with full load 367 miles, ferry range 1,193 miles.
Armament: provision for flex-mounting infantry machine guns in cargo-bay windows.

Mi-28N • NATO reporting name: Havoc-B

Brief: Specialized anti-tank attack helicopter developed starting in 1976 as a counterpart to AH-64 Apache. After many setbacks, the helicopter finally entered Russian military service in recent years. The Mi-28N is heavily armored with 770 lb of titanium and ceramic-plate protecting the cockpit and engine bays. The cockpit is further glazed in 35 to 50 mm bullet resistant glass, capable of withstanding a direct hit by a 12.7 mm round or 20 mm shell fragments. Engine ducting reduces the aircraft's IR signature by mixing hot exhaust through the rotor arc. The fuel tanks are self-sealing, and self-defensive equipment includes RWR, UV- and laser-warning receivers, and flares. Deliveries of 15 export Mi-28NE to Iraq began in 2014, and Algeria placed an order for 42 aircraft.

Extant Variant:

- Mi-28N. Standard version for VVS (NATO Havoc-B).

Function: Anti-armor, attack.
Delivered: from 2008.
Inventory: 80+ (167 ordered).
Accommodation: pilot, weapons operator.
Dimensions: rotor diameter 56.4 ft, length (with rotors) 69.4 ft, fuselage length 55.4 ft, wing span 16 ft.
Weight: combat T-O 24,250 lb, max T-O 26,676 lb.
Ceiling: 16,400 ft.
Performance: max speed 174 mph, speed 149 mph, combat radius 96 miles.
Armament: one single-barrel 30 mm 2A42-2 cannon (250 rd) in movable undernose turret. Standard eight (max 16) 9M120 Ataka-VN ATGMs, 9M39 Igla-V anti-aircraft missiles, 80 mm and 122 mm rockets, gun packs, various other weapons.



Mi-28N Havoc-B



An-22 Cock

STRATEGIC TRANSPORT AND TANKER AIRCRAFT

An-22 • NATO reporting name: Cock

Brief: Was the world's largest propeller-driven airlifter when it debuted in the late 1960s, powered by the same turboprop engines fitted to the Tu-95 Bear bomber. The aircraft's cargo bay is three feet wider than the Il-76 airlifter and cheaper to operate than the larger An-124 strategic airlifter. The Russian air force plans to keep the remaining An-22 fleet in service until 2020.
Function: Heavy airlift.
Delivered: 1969-76.
Inventory: six.
Accommodation: aircrew: five; 132,277 lb of cargo incl vehicles, missile systems, up to 151 paratroops, or 292 troops (in double-deck cabin configuration).
Dimensions: span 211.3 ft, length 188 ft, height 41.3 ft.
Weight: max T-O 496,040 lb.
Ceiling: 29,528 ft.
Performance: speed 373 mph, range 2,300 miles with full payload, max 5,900 miles.


An-124 Condor

An-124 • NATO reporting name: Condor

Brief: World's largest military transport aircraft, surpassing the C-5 Galaxy. Russian and Ukrainian contract carriers employed the aircraft in support of NATO operations in Afghanistan under the Strategic Airlift Interim Solution (SALIS) program from 2006 to 2014. The An-124 fleet is being updated to An-124-100 standards as aircraft are overhauled, bringing them up-to-date with civil airspace requirements.
Extant Variants:
• An-124. Heavy intratheater strategic airlifter.
• An-124-100. Upgraded aircraft with civil certification.
Function: Heavy, long-range strategic airlift.
Delivered: February 1987-92.
Inventory: 26.
Accommodation: aircrew: six; up to 330,693 lb of payload (max certified 264,554 lb) with drive-through access via nose and rear ramps.
Dimensions: span 240.5 ft, length 226.7 ft, height 69.2 ft.
Weight: empty 385,800 lb, max T-O 892,871 lb (An-124) or 864,210 lb (An-124-100).
Ceiling: 38,058 ft.
Performance: speed 497 mph, range 3,107 miles with 264,554 lb payload, max 9,998 miles.

Il-76 • NATO reporting name: Candid-B

Brief: The Russian air force's standard airlift platform. A total of 880 legacy Il-76s were produced at a plant in Uzbekistan from 1973 to 2011. Russia is relaunching domestic production of a modernized Il-76MD-90A version, incorporating a new wing, modern PS-90A-76 turbofans, and new avionics. The updates increase the aircraft's max T-O weight to 462,971 lb, while cutting fuel consumption by 12 percent. The new version is capable of carrying 40 tons of cargo more than 4,000 miles. New-build aircraft retain the legacy aircraft's cargo bay dimensions, which are too narrow to fit a large percentage of common military vehicles and equipment. The VVS is developing new tanker and AEW platforms based on the new production model. Plans are in place to retrofit a least 40 legacy aircraft to similar Il-76MDM standards. The newest Il-76MD-90A is slated to enter service in 2015.
Extant Variants:
• Il-76MD. Improved version of the legacy Il-76.
• Il-76MD-90A. Modernized, new-build aircraft based on the legacy Il-76.
Function: Medium/long-range airlift.
Delivered: June 1974-92; deliveries are to restart in 2015 against an order for 39 newly built aircraft by 2018.
Inventory: approx 110.
Accommodation: five aircrew; up to 105,822 lb of cargo; 126 paratroops or 167 troops (245 with upper-deck installed).
Dimensions: span 165.7 ft, length 152.9 ft, height 48.4 ft.
Weight: empty 196,211 lb, max T-O 418,878 lb.
Ceiling: 39,370 ft.
Performance: speed 485 mph, range 2,958 miles with 88,184-lb payload, max 4,847 miles.


Il-76MD Candid-B

Il-78 • NATO reporting name: Midas

Brief: Aerial tanker based on Il-76MD transport and the only tanker in Russian air force service. Russia is developing the new Il-78M-90A version, based on the new-build Il-76MD-90A airlifter, and is expected to enter production in 2016. The aircraft was adapted for the tanker role with cargo-bay tanks which are removable in Il-78 and permanent on the Il-78M. The aircraft is equipped with two wing-mounted pods to refuel combat aircraft and port-fuselage pod for refueling heavier aircraft.
Extant Variants:
• Il-78. Initial dual-role tanker/transport.
• Il-78M. Current operational version.
• Il-78M-90A. Developmental aircraft based on the new Il-76MD-90A.
Function: Tanker.
Delivered: 1985-93.
Inventory: approx 15.
Accommodation: six, incl refueling operator in the tail.
Dimensions: span 165.7 ft, length 152.9 ft, height 48.4 ft.
Weight: max T-O 462,970 lb.
Ceiling: refueling altitude: 6,562 to 29,525 ft.
Performance: speed 466 mph, refueling speed 267-367 mph, radius 3,138 miles when 44,092 lb of fuel delivered, or 2,144 miles when 88,185 lb delivered.

THEATER AND SPECIAL USE TRANSPORTS


An-12 Cub

An-12 • NATO reporting name: Cub

Brief: Was the Soviet Union's large tactical transport aircraft, specialized for airdrop and tactical insertion, similar to the US C-130. The An-12 has been replaced in the tactical role by the Il-76, but remains in service as a base-level support aircraft.
Extant Variants:
• An-12BK. Airlift variant (NATO Cub-A).
• An-12PP. Standoff EW escort aircraft (NATO Cub-C and Cub-D).
Function: Medium airlift, EW.
Delivered: May 1959-72.
Inventory: approx 65.
Accommodation: aircrew: six; up to 44,092 lb of cargo, 91 troops, or 60 paratroops.
Dimensions: wing span 124.8 ft, length 108.6 ft.
Weight: max T-O 134,482 lb.
Ceiling: 33,465 ft.
Performance: cruising speed 342 to 373 mph, range with full fuel 3,604 miles, range with full payload 1,243 miles.
Armament: two tail-mounted 23 mm cannons (some airframes); runway-illumination flare-bombs.


An-26 Curl

An-26 • NATO reporting name: Curl

Brief: Light transport aircraft derived from the civil An-24 commuter airliner, with a wider fuselage and hydraulically operated rear cargo-ramp (horizontally stowable for airdrop).
Extant Variants:
• An-26. Standard, light transport version (NATO Curl-A).
• An-26RT. Tactical communications-relay aircraft (NATO Curl-B).
• An-26M. AE aircraft with surgical facilities.
• An-26Sh. Navigation trainer.
Function: Light airlift, communications relay, AE.
Delivered: 1970-85.
Inventory: approx 140.
Accommodation: aircrew: three to five; up to 12,125 lb of cargo or 40 troops, or 30 paratroops. In AE configuration, 24 litter patients and three attendants.
Dimensions: wing span 95.8 ft, length 78.1 ft.
Weight: max T-O 52,910 lb.
Ceiling: 29,530 ft.
Performance: max speed 336 mph, max range 1,678 miles.
Armament: two illumination flare-bombs on racks at each side of the fuselage.

An-72 • NATO reporting name: Coaler

Brief: Twin-turbofan light STOL airlifter designed to replace the An-26. The aircraft incorporates blown-flap technology (similar to the Boeing YC-14) and is capable of operations from short, unimproved airstrips. The prototype Coaler-A incorporated a shorter aft fuselage and smaller wing, while Coaler-B is the civil variant. The military An-72 was originally intended to support special operations and directly supply frontline forces, but changes in military doctrine have resulted in An-72s primarily conducting executive airlift. The executive-configured An-72S is equipped with 38 passenger seats and a smaller cargo bay capable of transporting a small vehicle. Some airframes are fitted with a self-defensive suite.
Extant Variants:
• An-72. Standard production military transport (NATO Coaler-C).
• An-72S. Executive airlift version.
Function: Light airlift, VIP transport.
Delivered: 1986 to approx 1991.
Inventory: approx 30.
Accommodation: aircrew: three; standard 11,000 lb, max 22,000 lb of cargo.
Dimensions: span 104.6 ft, length 92.1 ft.
Weight: max T-O 80,469 lb.
Ceiling: 38,715 ft.
Performance: max speed 438 mph, speed 342 to 373 mph, T-O distance at maximum T-O weight 3,051 ft, landing distance 1,378 to 1,526 ft, range with full payload 839 miles, max range 2,983 miles.


An-72 Coaler

An-140-100

Brief: Turboprop commuter airliner intended to replace the An-24 with a faster, more efficient, and longer-range platform. Only 35 examples were produced on three assembly lines in Russia, Ukraine, and Iran, due to a lack of orders. The Russian military is the sole operator of the type, with 14 additional examples still on order.
Extant Variant:
• An-140-100. Production version.
Function: VIP transport.
Delivered: August 2011-present.
Inventory: eight (five VVS, three VMF); 14 ordered.
Accommodation: two aircrew, 52 passengers; max payload 13,228 lb.
Dimensions: wing span 83.7 ft, length 74.1 ft.
Weight: max T-O 47,400 lb.
Ceiling: 24,934 ft.
Performance: max speed 336 mph, range with max payload 808 miles, ferry range 2,300 miles.


An-140-100

An-148-100E

Brief: Regional jet used for executive airlift and intended to replace the 1960s-era Tu-134. The design was intended as a commercial aircraft but is operated almost exclusively by Russian military and government agencies. Six of the 15 aircraft ordered in 2013 are due to be delivered by mid-2015.
Extant Variant:
• An-148-100E. Extended-range version used by VVS.
Function: VIP transport.
Delivered: 2013-present.
Inventory: six.
Accommodation: two pilots, up to 80 passengers.
Dimensions: wing span 94.9 ft, length 95.6 ft.
Weight: max T-O 96,342 lb.
Ceiling: 40,026 ft.
Performance: max speed 540 mph, range 2,734 miles with 75 passengers.

L-410 Turbolet

Brief: Twin-turboprop light transport and executive aircraft widely used by the Soviet air force. The Soviet air force purchased 230 of the L-410UVP STOL version before the fall of the Soviet Union in 1991. Production of the Czech-designed and -built aircraft dwindled in the post-Soviet era. Manufacturer Let Kunovice was acquired by Russia in 2008, bringing renewed VVS and other Russian orders.
Extant Variants:
• L-410UVP. Early STOL version.
• L-410UVP-E20. Current production version with upgraded engines and avionics.
Function: Light transport.
Delivered: 1979-91; February 2011-present.
Inventory: approx 30 incl 11 new-production UVP-E20 versions.
Accommodation: two pilots and 19 passengers.
Dimensions: wing span 65.6 ft, length 47.3 ft.
Weight: max T-O 14,550 lb.
Ceiling: 27,500 ft.
Performance: max speed 251.7 mph, max range 944.5 miles.

Tu-134 • NATO reporting name: Crusty

Brief: Soviet-era commercial aircraft converted as a VIP transport for the defense ministry command staff. Most aircraft are equipped with long-range comms, identifiable by the "stinger" antenna protruding from the tail. The passenger cabin is divided into three compartments including a planning room, rest area, and comms.
Extant Variants:
• Tu-134A. Standard variant.
• Tu-134B. Later aircraft with improved avionics and smaller flight crew.
• Tu-134Sh. Bomber navigator trainer.
• Tu-134UBL. Bomber pilot trainer.
Function: VIP transport, trainer.
Delivered: 1966-84.
Inventory: approx 100.



Tu-134UBL Crusty

Accommodation: aircrew: three; 80 passengers or 12 trainees.
Dimensions: wing span 95.2 ft, length 122.4 ft, (Tu-134UBL) 137.5 ft.
Weight: max T-O 104,940 lb.
Ceiling: 38,715 ft.
Performance: max speed 564 mph, range with max payload 1,367 miles, max range 2,237 miles.
Armament (bomber crew trainer): eight 110-lb practice bombs.

Tu-154 • NATO reporting name: Careless

Brief: Medium-range airliner equivalent to the Boeing 727 and currently used for passenger airlift and treaty verification flights permitted under the 1992 Open Skies treaty.
Extant Variants:
• Tu-154B-2. Most numerous version powered by Kuznetsov NK-8-2U turbofans.
• Tu-154M. Aircraft equipped with newer D-30KU-154 engines.
• Tu-154M-LK1. Photo surveillance aircraft for the Open Skies program.
Function: Passenger airlift, photo surveillance.
Delivered: 1972 to 2013.
Inventory: approx 20, incl one Tu-154M-LK1.
Accommodation: crew: three to four; up to 180 passengers.
Dimensions: wing span 123.2 ft, length 157.2 ft.
Weight: max T-O 220,462 lb.
Ceiling: 39,040 ft.
Performance: speed 581 mph, range with full payload 2,360 miles, max range 4,100 miles.

MARITIME PATROL AND ANTISUBMARINE AIRCRAFT



Be-12 Mail

Photo by Piotr Butowski

Be-12 • NATO reporting name: Mail

Brief: Turboprop amphibian originally designed for ASW and currently used for noncombat patrol. Russian naval aviation announced in 2015 its intention to modernize the Be-12 fleet, specifically to restore its ASW capability. Several non-airworthy airframes could potentially be returned to service if the plans are implemented.
Function: ASW; maritime patrol.
Delivered: 1964-73.
Inventory: three.
Accommodation: four.
Dimensions: span 97.9 ft, length 98.8 ft, height on parking 29.9 ft.
Weight: max T-O 79,366 lb.
Ceiling: 26,250 ft.
Performance: max speed 329 mph, max range 2,237 miles.
Armament: 3,300 lb (max 6,614 lb with reduced fuel load) of weapons and stores incl torpedoes, depth charges, mines, and sonobuoys in an internal bay.

Il-38 • NATO reporting name: May

Brief: ASW aircraft derived from the Il-18 airliner and roughly equivalent to the Lockheed P-3 Orion. The Il-38 combines the Il-18s wings, tail, engines, and landing gear with a completely redesigned fuselage with two internal weapons bays. The aircraft's Berkut search radar is housed in the bulbous underfuselage radome and its magnetic anomaly detector (MAD) is housed in the tail "stinger." A fleet upgrade begun in 2014 replaces the aircraft's legacy mission computers with the new Novella-P-38 system, which includes the electronic support measures (ESM) sensors fitted in a box over the forward fuselage, new C- and I-band radar, MAD equipment, sonobuoy system, and FLIR turret. Russia has many stored airframes that could be overhauled and returned to future service. The export Il-38SD Sea Dragon variant is operated by India's navy.
Extant Variants:
• Il-38. Legacy variant.
• Il-38N. Upgraded aircraft with modernized sensors and mission system.
Function: Shore-based ASW, maritime patrol.
Delivered: 1968-72.
Inventory: 22 incl four upgraded Il-38Ns.
Accommodation: eight.
Dimensions: span 122.8 ft, length 131.7 ft, height 33.4 ft.
Weight: max T-O 145,500 lb.
Ceiling: mission altitude 330 ft through 3,300 ft.
Performance: max speed 400 mph, mission speed 200 to 250 mph, ferry range 5,900 miles, patrol duration three hours at 1,400 miles.
Armament: standard 12,000 lb (max 18,500 lb) of buoys and weapons incl APR-2, APR-3, AT-2, or UMGT-1 torpedoes, PLAB-250 or RBK-100 depth charges, Zagon guided depth charges, or one RYu-2 nuclear depth charge. India's Il-38 will carry two Kh-35E anti-ship missiles.

Ka-27 • NATO reporting name: Helix

Brief: Ship- or shore-based family of ASW and SAR helicopters. Manufacturer Kamov's typical twin-coaxial contrarotating rotor arrangement makes the helicopter compact despite its 24,000-lb weight, making it ideal for ship-borne deployment. Kamov designed an entire series of civil and military designs based on the Ka-27's core systems, including the Ka-29 attack, Ka-31 and Ka-35 radar platforms, export Ka-28, and civil Ka-32. Russia began upgrading the first eight airframes to Ka-27M standards in 2015 with plans to modernize 46 by 2020. Modifications include new avionics, AESA radar, MAD, EW, dipping sonar, sonobouy, and navigator's tactical display. New weapons include APR-3 rocket-propelled torpedo and Zagon-2 guided depth charge.
Extant Variants:
• Ka-27. Standard ASW version (NATO Helix-A).
• Ka-27PS. SAR version (NATO Helix-D).
• Ka-27M. Current upgraded version.
Function: ASW, SAR.
Delivered: 1979-91.
Inventory: approx 80 incl 60+ ASW (some non-airworthy).
Accommodation: three.
Dimensions: rotor diameter 52.2 ft, fuselage length 37.1 ft, height 17.7 ft.
Weight: max T-O 24,251 lb.
Ceiling: 11,500 ft.
Performance: max speed 180 mph, range 435 miles, patrol duration one hour, 25 minutes at 125 miles from base.
Armament: 1,323 lb (max 2,205 lb) of weapons and stores in heated bay, incl one APR-2, AT-1MV or UMGT-1 torpedo; depth charges, sonobuoys.

Tu-142 • NATO reporting names: Bear-F, Bear-J

Brief: ASW and maritime patrol version of the Tu-95 Bear strategic bomber designed to operate at distances up to 2,500 miles from a shore base. The aircraft's Korshun (Black Kite) sensor system couples search radar, sonobuoys, and tactical-data presentation system. The aircraft's MAD sensor functions as an independent system. The most recent Tu-142MZ incorporates the newer Zarechye sonobuoy system and



Il-38N May

Photo by Piotr Butowski



Tu-142MR Bear-J

Sayany-M ECM suite. The Russian navy opted not to upgrade the overall Tu-142 fleet's Soviet-era mission equipment, prioritizing the Il-38N instead. The Tu-142MR version is specially equipped as an airborne nuclear command post similar to the US Navy's E-6 Mercury, ensuring unbroken contact with ballistic missile submarines.

Extant Variants:
- Tu-142MK. Standard long-range ASW version (NATO Bear-F Mod 3).
- Tu-142MZ. Late-model ASW version (NATO Bear-F Mod 4).
- Tu-142MR. Airborne nuclear command post (NATO Bear-J).

Function: Long-range ASW.
Delivered: 1968-94.
Inventory: approx 20 of all versions.
Accommodation: two pilots, two navigators, navigator/weapons-system operator, three mission system operators, technician, rear gunner, and ECM operator on equipped airframes.
Dimensions: span 164.2 ft, length 174.2 ft, height 44.7 ft.
Weight: max T-O 407,885 lb.
Ceiling: 39,400 ft.
Performance: max speed 531 mph, speed 457 mph, range 7,456 miles, patrol duration four hours, 10 minutes at 2,500 miles from base.
Armament: 9,700 lb (max 19,800 lb) in two fuselage bays. Options incl three APR-3, APR-2, AT-2M or UMGT-1 torpedoes, depth charges (incl nuclear ones), mines, and sonobuoys.

TRAINER AIRCRAFT

An-2 • NATO reporting name: Colt

Brief: The partially fabric-covered An-2 biplane is the oldest type still in Russian air force service, and several dozen are retained to support airborne troops' parachute jump-training (similar to the Air Force's UV-18 Twin Otter).
Function: Utility.
Inventory: dozens.
Accommodation: two pilots, 12 passengers/paratroops.
Dimensions: length 41.8 ft, wing span 59.6 ft.
Weight: max T-O 12,130 lb.
Ceiling: 13,650 ft.
Performance: speed 157 mph, T-O/landing run 722 ft/738 ft, max range 864 miles.

Ansat-U

Brief: Trainer and light utility helicopter in Russian air force service. The lightweight helicopter is equipped with unique fly-by-wire controls that allow it to imitate the handling characteristics of large, heavy helicopters for pilot training.
Extant Variant:
- Ansat-U. VVS trainer variant fitted with wheeled undercarriage instead of skids.

Function: Trainer.
Delivered: from 2009.
Inventory: more than 30 (40 ordered).
Accommodation: two pilots, nine passengers.
Dimensions: rotor diameter 37.7 ft, length with rotors turning 44.4 ft.
Weight: max 7,280 lb.
Ceiling: 18,700 ft.
Performance: speed 171 mph, max range 316 miles.



Ansat-U



Ka-226 Hoodlum

Ka-226V • NATO reporting name: Hoodlum

Brief: Training and light utility helicopter used by the Russian air force. It features a modular exoskeleton fuselage containing the cockpit, engines, empennage, and undercarriage that can be paired with specialized, interchangeable payload pods for cargo, passenger, AE, or other roles.
Function: Trainer, utility.
Delivered: 2011-15.
Inventory: 42.
Accommodation: two pilots, eight passengers.
Dimensions: fuselage length 28.2 ft, rotor diameter 42.7 ft.
Weight: max 7,496 lb.
Ceiling: 16,404 ft.
Performance: max speed 137 mph, range with standard fuel 373 miles.

L-39C Albatros

Brief: Czech-built single engine jet trainer introduced during the Soviet-era and still used as the Russian air force's standard military pilot training platform, despite introduction of the Yak-130. The aircraft retains its 1970s avionics suite but uses new Bekas-03 radios. The original ejection seats are being gradually replaced by new Russian-built K-93 seats.
Function: Advanced trainer.
Delivered: 1971-91.
Inventory: approx 150.
Accommodation: two pilots in tandem ejection seats.
Dimensions: length 39.8 ft, wing span 31.0 ft.
Weight: max 10,362 lb.
Ceiling: 37,730 ft.
Performance: speed 466 mph, normal range 684 miles, ferry 1,087 miles.
Armament: two underwing pylons for rocket pods/bombs.

Yak-130 • NATO reporting name: Mitten

Brief: New generation light-attack/trainer jointly developed by Yakovlev and Italy's Aermacchi. The twin-jet, swept wing subsonic trainer boasts a high thrust-to-weight ratio and quadruple digital fly-by-wire control systems. The aircraft incorporates wingtip decoy launchers, and new radar and targeting pods are being developed to expand its combat capability. In addition to Russian air force orders, Russia is exporting Yak-130 versions to Algeria, Bangladesh, and Belarus. The VVS has orders for 89 aircraft and plans to purchase an additional 150 by 2020.
Extant Variant:
- Yak-130. Next generation fly-by-wire light-attack/trainer.

Function: Trainer.
Delivered: from February 2010.
Inventory: 65.
Accommodation: two pilots in tandem ejection seats.
Dimensions: wing span 32.3 ft, length 37.7 ft.
Weight: trainer configuration 15,935 lb, max 22,679 lb.
Ceiling: 41,013 ft.
Performance: max speed 659 mph, approach speed 118 mph, range clean 994 miles, ferry 1,305 miles, T-O run 1,804 ft, landing run 2,461 ft.
Armament: provision for centerline 23 mm gun pod, up to 6,614 lb, incl R-73 air-to-air missiles, Kh-25M air-to-surface missiles, KAB-500 GBUs, rockets, and gun pods. ✪

ACRONYMS

AE aeromedical evacuation
AESA active electronically scanned array
AGM air-to-ground missile
ALCM air launched cruise missile
ASW anti-submarine warfare
CAS close air support
CBU cluster bomb unit
COIN counterinsurgency
CSAR combat search and rescue
ECM electronic countermeasures
Elint electronic intelligence
EO electro-optical
EW electronic warfare
FCR fire-control radar
FLIR forward-looking infrared
GBU guided bomb unit
HMS helmet-mounted sight
INS inertial navigation system
IR infrared
IRST infrared search and track
LCD liquid crystal display
LO low observable
MAD Magnetic Anomaly Detector
MLU midlife upgrade
PESA passive electronically scanned array
PGM precision guided munitions
RWR radar warning receiver
SAM surface-to-air missile
SAR search and rescue
Satnav satellite navigation
SEAD suppression of enemy air defenses
Sigint signals intelligence
SLAR side-looking airborne radar
SOF special operations forces
STOL short takeoff and landing
T-O takeoff
VLF very low frequency
VMF Russian navy (Voyenno-Morskoy Flot)
VVS Russian airforce (Voyenno-Vozdushnye Sily)
WSO weapon systems officer

AFA National Report

natrep@afa.org

By Frances McKenney, Assistant Managing Editor

Emerging Leaders

The Air Force Association's Emerging Leaders Program began in 2013 as a way to prepare volunteers for future AFA leadership roles. Emerging Leaders serve for a year. They participate on a national-level council, attend national leader orientations, and serve as National Convention delegates.

Emerging Leaders for 2015 are: Emilie S. Boschert, Shannon M. Farrell, Deborah A. Landry, Michael J. Liquori, Emily C. Shay, Christopher M. Talbot, James A. Thurber, Jeremy Trotter, and Daniel Whalen.

Here's the last profile in AFA's second group of Emerging Leaders.



Capt. Daniel P. Whalen
Home State: West Virginia.
Chapter: Delaware Galaxy (Del.).
AFA Offices: Member of two national-level committees—Finance and Strategic Planning—and Galaxy Chapter VP. Former ex-officio member of the AFA Board of Directors; former member of two national-level committees, Membership and Aerospace Education Council; and former Albuquerque Chapter (N.M.) communications VP.

Occupation: Maintenance operations officer, 736th Aircraft Maintenance Squadron, Dover AFB, Del.

Education: B.S., West Virginia University; M.S., American Military University.

Q&A

How do you recruit members? I mostly talk about, with younger folks, the professional development aspect of the organization. There's no other place where you get to work with senior officers in an environment where you're their equal.

How should AFA change? It's a strategic problem that we have: How to get younger folks [to join], and so one of the ways we have done that is ... what we think is the easiest way to reach out to younger people, through Arnold Air Society and Silver Wings, to make sure [they continue] their memberships [when they go on] Active Duty.

What's AFA future? I don't see us ... changing in our mission, but I see our population changing—in our membership.



Photo by Isaac McDermott

Whalen speaks at an Arnold Air Society and Silver Wings gathering. He's been a member and consultant for the two organizations for a decade.

Photo by Amy Gold



An Eglin Chapter scholarship winner, Dalton Jens from Northwest Florida College, takes a selfie with chapter Aerospace Education Foundation Chairman Mike Kostelnik (l) and Roy Taylor (r), guest speaker. The chapter awarded more than $20,000 in scholarships in May at the Air Force Armament Museum.

Taking Care of the Warriors

When Eglin AFB, Fla., hosted the 2015 Air Force Wounded Warrior Introductory Sports Camp & the Air Force Warrior Games Training Camp in April, the **Eglin Chapter** pitched in by rounding up food to keep the athletes fueled.

The sports camps take place all over the county and allow wounded military members to try new social settings, be part of a team, act as mentors, and learn skills they can adapt to their needs, said Amanda Gold, chapter communications VP. She wrote that while training in Florida, the airmen used weights and straps for balance in discus and shot put, and some played—or learned, if they were new to this—seated volleyball and wheelchair basketball. "Along with swimming, track, and yoga, there was something for everyone of every level of ability," she said.

The chapter worked with the base's 96th Support Squadron to provide water, snacks, lunches, and support donated by the surrounding communities of Niceville and Fort Walton Beach. In particular, chapter members coordinated contributions from community sponsors, while the 96th organized runners who picked up items and delivered them to the Wounded Warrior camps.

Gold listed some of the contributions: cases of water, mini-burgers, quarter-pounder sandwiches, ham sandwiches,

Continued on p. 75



In Iowa, Lt. Col. Justin Faiferlick presents an AFA Civil Air Patrol Outstanding Cadet of the Year Award to Austin Hermanson. A member of CAP's Northwest Iowa Composite Squadron, Hermanson has been a cadet for more than two years. Faiferlick was AFA's national treasurer and is now an AFA national director emeritus and treasurer for Iowa's Fort Dodge Chapter.

How to Enhance a Theme

The **Keystone Chapter** at Kadena AB, Japan, knows how to take a theme and build on it.

In March, the chapter organized 5K and 10K runs, featuring a baby jogger division, to help the base on Okinawa observe Women's History Month.

Next, the chapter highlighted the Month of the Military Child.

Chapter President SSgt. Abraham N. Almonte said the members created and hosted Airpower Week, April 27 to May 1, to promote the DOD's theme.

Almonte explained that the chapter took the emphasis on children and combined it with a focus on science, technology, education, and math. "Throughout the week, we mentored 400 school-age children on aviation-related STEM topics," he said. Thirty volunteers from the chapter and other airmen visited two care centers for American military school-age children. The visitors brought equipment like a pilot's helmet for show and tell and conducted short lessons.

Airpower Week culminated with children touring aircraft on static display at the flight line.

The chapter zeroed in on care center children "because we feel that they are the ones that are impacted the most by their parents working those long hours," Almonte said.

How does piggybacking on a theme pay off?

- Chapter members demonstrate community service.
- It catches the attention of the media, which always needs new approaches to highlighting annual events.
- It gains publicity for the AFA chapter.

Photos by Nicole Comas





SSgt. Jeremy Pekins explains some aspects of a KC-135 engine. Below: SrA. Blaise Ruff guides students through the tanker's cockpit. Below right: Kadena's public affairs office staff covered these events and, here, photographed MC-130 pilot Capt. John Bowman handling Q&A from the youngsters.



Photo by Nicole Comas

L-r: Kadena airmen, including AFA Life Member Col. Paul Johnson (in flight suit), speak to some of the 120 children who toured the aircraft put on static display. The Keystone Chapter organized this event for Month of the Military Child.



Photo by SSgt. Abraham Almonte

At a children's center, Keystone volunteers taught the youngsters the basics of airplane propulsion. Above: A student gives his all during the hands-on part of the lesson.



USAF photo via A1C Zade Vadnais

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Sal Capriglione Chapter (N.J.) President Joseph Capriglione (l) and Loretta Thornton (r) of the Skyway Foundation awarded their organizations' scholarship to New Jersey Institute of Technology AFROTC cadet David Kantrowitz (c). The presentation took place at NJIT's scholarship brunch.

boxed lunches, cookies, turkey wraps, fruit, sandwich trays, pizza, hot wings, and salads. One donor even provided massages for the athletes and for Caregivers' Appreciation Day.

"It was flawless teamwork on so many levels," commented Candace Lovell, chapter VP.

Some 80 wounded airmen and assistants benefitted from the goods and services. This was the wounded warriors' first visit to the Eglin area, said Gold.

Missileer Award in New York City

Maj. Gen. Jack Weinstein, 20th Air Force commander, presented the **Iron Gate Chapter's** first awards to missileers at a luncheon in New York City in April.

First Lt. Victoria Fort, of the 91st Missile Wing at Minot AFB, N.D., and Capt. Chris Conant of the 509th Bomb Wing at Whiteman AFB, Mo., each received a Gen. Curtis E. LeMay Award from the chapter, recognition for the officers' distinguished service with integrity.

Among the special guests at this luncheon were Fort's and Conant's colleagues and family and Jeanine Pirro, a Fox News legal analyst and host of "Justice with Judge Jeanine" TV program. AFA officials on hand included National Director Kevin L. Jackson. ✪

Photo via TSgt. William Fitzpatrick

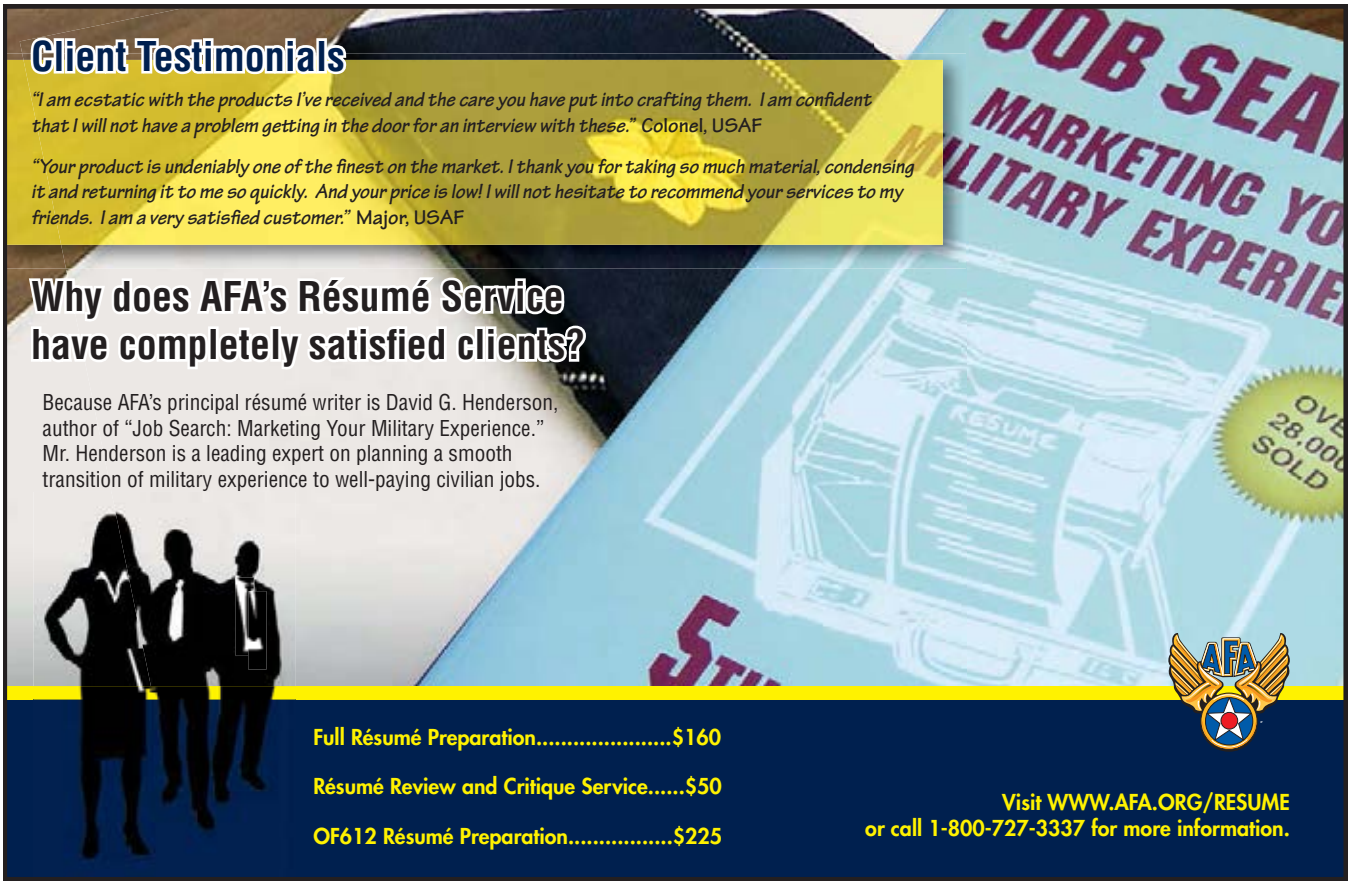


In Albuquerque, N.M., Ryan Fitzgerald receives an AFA Civil Air Patrol Outstanding Cadet of the Year Award, pinned on by his father, Col. Michael Fitzgerald. The senior Fitzgerald is with the Air Force Inspection Agency, Kirtland AFB, N.M. His son is cadet leader, CAP 811th Cadet Squadron.

Photo by Owen Costello



20th Air Force Commander Maj. Gen. Jack Weinstein describes the Force Improvement Program underway at Air Force Global Strike Command. He spoke in April to an Iron Gate Chapter luncheon at New York City's 21 Club.





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Photo via 131st Bomb Wing PAO



Trenton Hughes, great-grandson of James Burson of the Whiteman Chapter, Mo., enlists in the 131st Bomb Wing. First Lt. Kenneth Pedersen administers the oath.

Photo by Herman Nicely



The Chuck Yeager Chapter, W.Va., sponsored an AFJROTC drill competition in April. Five schools sent teams. Overall winners from Pine-Richland High School in Gibsonia, Pa., show off their hardware haul, including their Grand Champion trophy.

Reunions

reunions@afa.org

12-15th Tactical Fighter Wg., MacDill AFB, FL. Oct. 22-25, Dallas/Fort Worth, TX. **Contact:** C. Bauer (bauerweb@cfl.rr.com).

71th Special Ops Sq/305th Rescue Sq/943th Rescue Gp (1987-2015). Sept. 11-12, Starr Pass Resort and Davis Monthan AFB, AZ. **Contact:** Pete McNall (520 820-1024) (petemcnall@gmail.com).

100th Bomb Gp Foundation, Thorpe Abbotts, UK (1942-45). Sept. 24-27, Hilton New Orleans Hotel, LA. **Contact:** 100thbg.com and choose 2015 Reunion.

344th BG/454th BS. Sept. 10-12, St. Louis **Contact:** George Cornett, 8250 E. Obispo Ave., Mesa, AZ 85212 (480-577-6299) (kellie93@centurylink.net).

461st Bomb Wg, Amarillo AFB, TX. Sept. 30-Oct. 4, Wyndham Garden Oklahoma City Airport Hotel, Oklahoma City. **Contact:** Ned Kerr (nedkerr@cableone.net).

A-37 Assn, open to all. Aug. 13-16, Nashville, TN. **Contacts:** Vic Grahn (850-835-4495) or Ollie Maier (omaier@txstate.edu).

Combat Control Assn. Oct. 15-17, Destin, FL. **Contact:** reunion@usafca.org or Chris Larkin (850-499-0776).

USAF Air Weather Recon Assn. Oct. 21-25, Tucson, AZ. **Contact:** Bob Tuttle (907-242-5479) (jabob@gci.net).

UPT Class 62-A. Sept. 30-Oct. 2, Wright-Patterson, OH. **Contact:** Dave Tippett, 227 Forest Creek Dr., Bozeman, MT 59718 (406-570-8290).

UPT Class 70-06, Craig AFB, AL. Oct. 1-4, Antlers Hilton Hotel, Colorado Springs CO. **Contact:** Bob Denny (719-488-8328) (jrdjr d@aol.com).

RED HORSE & Prime BEEF. Oct. 12-16, Fort Walton Beach, FL. **Contact:** Dick Aldinger (407-859-7436) (famdinger@aol.com). ■

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1-888-468-5511 or
www.GovX.com/AFA for 20-50% off apparel and sporting gear

- **AFA Hangar Store**

Items with AFA, AFM, Wounded Airman Program, and Cyberpatriot logos
1-800-727-3337 for a catalog or
www.afa.org/store

- **Apple Member Purchase Program**

1-877-377-6362 or store.apple.com/us/go/eppstore/airforce

- **Dell's Member Purchase Program**

1-800-293-3492 or www.dell.com/afa
Use ID DS 126348550

- **AFA Christmas and Holiday Cards & Gifts** (July-Dec)

1-800-556-5489 or
www.holidaycardcenter.org/afacards

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- **Résumé Assistance**

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www.afa.org/resume

- **eKnowledge™ SAT/ACT Discounts**

www.eKnowledge.com/AFA or
1-951-256-4076 Reference AFA

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www.afa.org/hotels
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1-866-691-5109 mention AFA Membership or
www.govvacationrewards.com/afa

- **Car & Truck Rental Discounts**

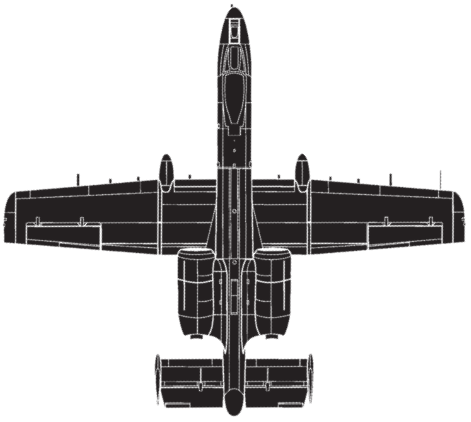
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Budget: 1-800-455-2848 Reference BCD X201400 or www.budget.com/afa
Budget Truck: 1-800-566-8422 Reference 56000083928 or www.budgettruck.com/airforce.aspx

- **zipcar**

www.zipcar.com/partners/afa
1-866-4ZIPCAR (866-494-7227)

Artwork by Zaur Eylanbekov

A-10 Thunderbolt II



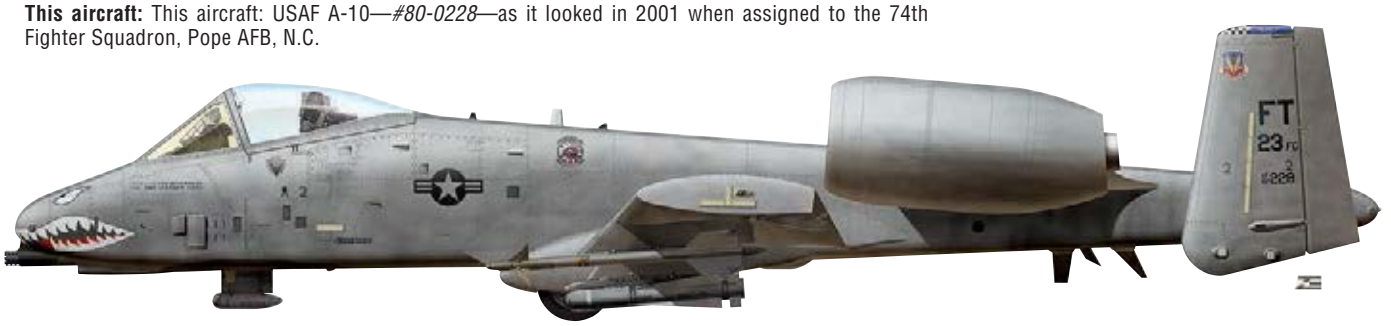
The A-10 Thunderbolt II dates to 1967, when USAF began an A-X program to develop a dedicated close air support aircraft. The service wanted its new fighter to be uncomplicated, able to absorb massive battle damage, easy to maintain, operable from unimproved strips with heavy ordnance loads, and cheap. Speed and sleekness were not must-haves. The result—Fairchild Republic's plain but now-famous Warthog—proved to be all the Air Force wanted, and more.

This rugged, twin-engine, straight wing aircraft was optimized to destroy Soviet armor. It was built around General Electric's 30 mm GAU-8 cannon, its main weapon, though it employs Maverick missiles and bombs, too. With excellent maneuverability at low speed and altitude, the A-10 is highly accurate and survivable. It can loiter in a battle area for long periods. Expected to fly low-and-slow missions in high-threat areas, the A-10 was given a "bathtub" of titanium armor to shield the pilot and critical parts. Most systems are redundant and protected. The A-10A was the first and only type ever built, but all A models have been upgraded to a more advanced A-10C configuration.

Though the A-10 was built to meet the Soviet armor threat, it proved its mettle in the 1991 Persian Gulf War and since that time has played a key role in every major US combat action. In this work, it has shown itself to be exceptionally tough, surviving multiple direct hits—even loss of control surfaces—while remaining flyable.

—Robert S. Dudney with Walter J. Boyne

This aircraft: This aircraft: USAF A-10—*#80-0228*—as it looked in 2001 when assigned to the 74th Fighter Squadron, Pope AFB, N.C.



USAF photo by A1C Ryan Callaghan



An A-10 Warthog under a sun shade at Moody AFB, Ga.

In Brief

Designed, built by Fairchild Republic ★ first flight May 10, 1972 ★ number built 716 ★ crew of one ★ two General Electric TF34-GE-100A turbofan engines. **Specific to A-10A:** offensive armament, one 30 mm GAU-8A multibarrel cannon ★ defensive armament up to four AIM-9 Sidewinders ★ load up to 16,000 lb of bombs and munitions, including up to six AGM-65 Mavericks ★ max speed 439 mph ★ cruise speed 387 mph ★ max range 620 mi ★ weight (loaded) 50,000 lb ★ span 57 ft 6 in ★ length 53 ft 4 in ★ height 14 ft 8 in ★ service ceiling 30,500 ft.

Famous Fliers

Air Force Cross: Paul Johnson. **Mackay Trophy:** Scott Markle. **Silver Star:** John Cherrey, Raymond Strasburger. **Distinguished Flying Cross:** Kim Campbell, Scott Campbell, Aaron Cavasos, Bob Efferson, Jeffrey Fox, Michael Meier, Aaron Palan, Jeremiah Parvin, Richard Pauly, Keith Wolak. **POW:** Richard Storr. **Notables:** Mark Welsh III (CSAF), Martha McSally (first USAF woman in air combat, first woman to command USAF fighter squadron), Robert Swain (first A-10 air-to-air victory), Chad Hennings (Dallas Cowboys, College Football Hall of Fame). **Test pilot:** Howard "Sam" Nelson.

Interesting Facts

Nicknamed and universally known as the Warthog ★ contains many parts (engines, vertical stablizers, landing gear) that can be used on left or right sides ★ can fly without one engine, one tail, one elevator, and half a wing ★ developed in response to heavy aircraft losses in Vietnam War ★ took over FAC role (OA-10) in 1989 ★ sports 1,200 lb of titanium armor shielding cockpit and vital systems ★ first USAF aircraft built exclusively for CAS ★ fires 4,000 cannon rounds per minute ★ first aircraft with all engines powered by a biofuel blend ★ can open and lock landing gear using only wind and the pull of gravity ★ fires armor-piercing shells of depleted uranium.





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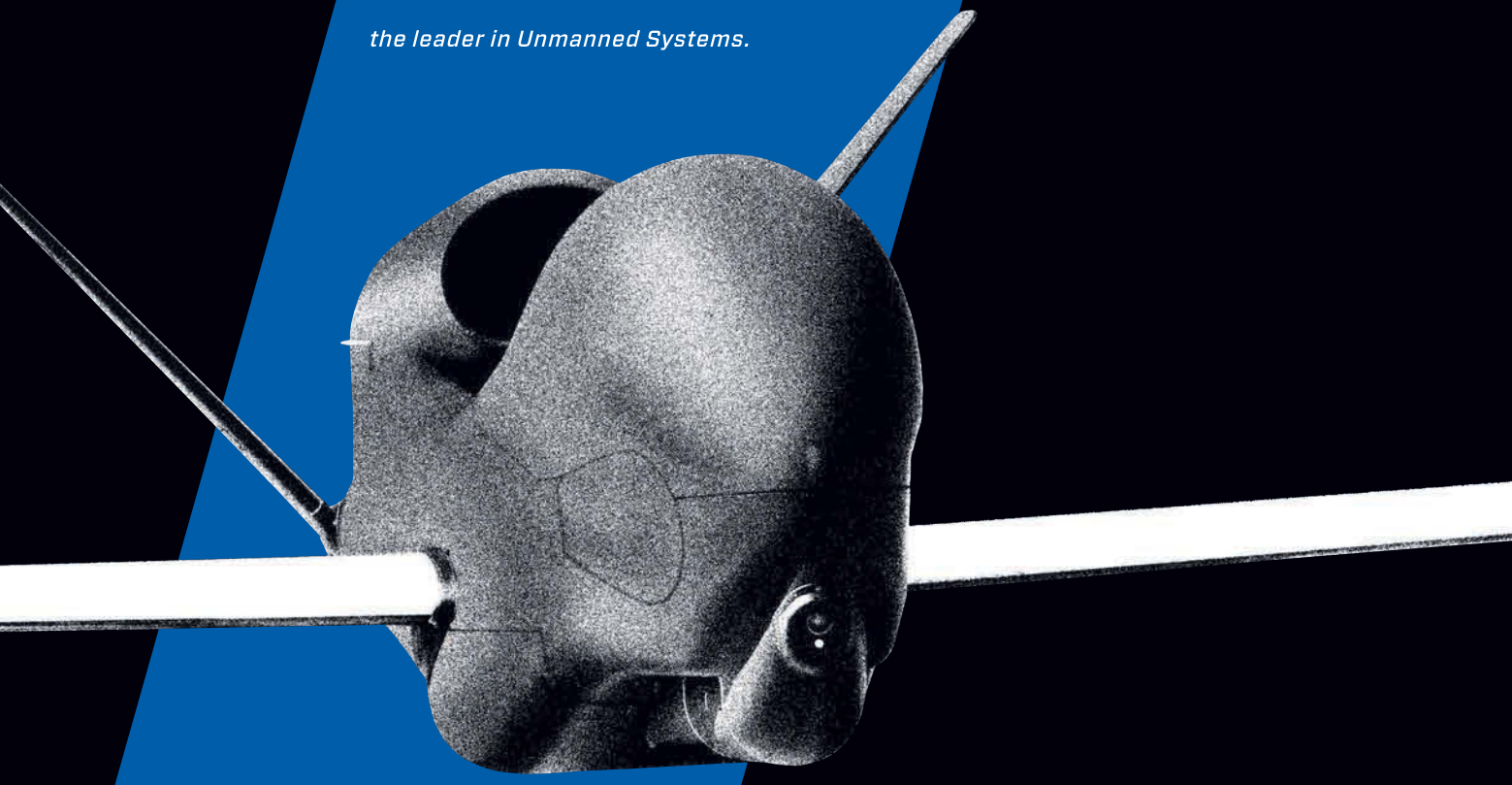
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