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Key Points

The Air Force's pilot-training pipeline is a strategic national asset, vital to the potency and viability of US aerospace power. Its robustness is crucial to support the new National Defense Strategy that places emphasis on countering China and Russia. Leaders in the executive branch and Congress must recognize the pipeline's importance, funding it at levels allowing it to ensure capacity as aligned with demand in a resilient, sustainable fashion.

As Air Force pilot training ramps up to overcome the service's severe pilot shortage, opportunities exist for transformation of the training enterprise. The Air Force should embrace innovations, utilize more contracted services, and eliminate inefficiencies. Initial flight training has validated that contractor-run operations are viable.

The T-X Advanced Pilot Training Family of Systems is vital to the training pipeline's future. The Air Force must avoid introducing unnecessary risk into the T-X acquisition, while balancing long-term performance and value with the service's pursuit of cost savings. Any T-X delays would have serious consequences to US aerospace power.

Protecting the "Pipeline": Overcoming the Air Force's Pilot Shortage

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Abstract

The US Air Force is increasingly challenged to meet national security requirements due to a shortage of trained, qualified pilots. The service finds itself about 2,000 pilots short, including nearly 1,300 empty fighter-pilot seats, and the trend is worsening.

Service leadership calls this a crisis. Many experienced pilots are leaving to work for commercial airlines, which are now hiring at high levels, and will be doing so for the foreseeable future. The Air Force is adopting a two-pronged response: instituting quality-of-life and quality-of-service measures to boost retention and increasing annual production of new pilots by 25 percent over the next several years.

Air Force leadership must remain vigilant in monitoring the shortage. Experienced pilots are a valuable commodity, and many are voicing specific concerns that tie to their desire to remain in the service. They should not have to deal with an unresponsive, indifferent bureaucracy when seeking a solution to remain in uniform. Further, the pilot-training pipeline is a strategic national asset. As such, the Department of Defense and Congress should fund the enterprise at levels that grow its ability to produce greater amounts of pilots when circumstances warrant. The T-X Advanced Pilot Training Family of Systems (APT FoS) will be an integral component of future pilot production process and must be prioritized accordingly with rapid fielding and investment across the Air Force's training enterprise.

There is the opportunity—and an imperative—to reinvigorate the Air Force's pilot-training pipeline as part of the production ramp-up, by removing inefficiencies, leveraging innovation, and rethinking the training enterprise as a whole. The Air Force should be open to experimentation with promising training concepts, and must show the courage to surmount parochial interests to jettison outdated pipeline elements, and should not shy away from accepting a greater role for contractors.

Introduction

The US Air Force currently finds itself some 2,000 pilots short of its requirements in its manned and remotely piloted aircraft fleets, a situation service leadership calls a crisis. The deficit stands at about nine percent overall and is at its worst in the fighter community, where there are around 1,300 empty pilot slots, a 25 percent vacancy.¹

Without pilots, airplanes cannot fly, and the service is stretched thin to meet real-world security demands. Pilots eligible to separate are continuing to walk away from the service at a rate that is triggering alarm bells, with the trend worsening over the past few years. These experienced pilots are mostly leaving to join the commercial airlines, which are hiring at high levels to backfill their own respective capacity gap and can offer generous compensation and a better work-life balance.

These airmen declare that they are worn out from the Air Force's unrelenting high deployment tempo over the last 27 years. But that's not all. A

tour back at home provides little relief, as units struggle to regenerate full spectrum readiness and have to wade through bureaucratic requirements worsened by personnel cuts. Congress' inability to provide stable and predictable budgets in recent years has proved disastrous. The pending T-X pilot training system award and the health of the pilot training enterprise as a whole, as a result, has taken on enormous import with regard to the vitality of the US Air Force in the coming decades, as the effort's success or failure will have wide ranging impacts on the service's ability to build, train, and retain pilots for years to come.

The Air Force has also continued to shed force structure in the years since Operation Desert Storm, while at the same time deploying the fighter force at a higher rate. "We are too small for all the missions that we're being asked to carry out on behalf of the nation. And, as a result, we're burning out our people. Surge has become the new normal in the United States Air Force," service Secretary Heather A. Wilson told reporters at the Pentagon in November 2017 in explaining the pilot exodus.² "Less than one percent of Americans serve in uniform and protect the rest of us, and they are carrying a very heavy burden. And, at some point,

families make a decision that they just can't keep doing this at this pace," she explained. Though the Air Force has not seen performance loss in its active duty squadrons due to pilot shortages, this possibility might be inevitable, said Gen David L. Goldfein, Air Force Chief of Staff, at the same press briefing.³ "We're making the mission happen, but we're having to do it, very often, on the backs of our airmen. ... The tension on the force right now is significant," he said. Speaking two months earlier at the summit the Air Force leadership held to discuss responses to the crisis, Goldfein warned: "If we don't find a way to turn this around, our ability to defend the nation [will be] compromised."⁴

Nor do Air Force pilots find themselves without alternate employment options. The commercial airlines are hiring pilots at an amplified rate to account for expansion in the industry and a wave of mandatory retirements across its ranks. In Fiscal 2017, the major US airlines hired nearly 5,000 pilots, the most since 2000, and Air Force and industry experts expect high levels of hiring to continue for at least the next decade.⁵ The airlines are not looking for new pilots, but rather experienced aviators, making Air Force and other military pilots who have completed their initial service commitments and are eligible to separate highly attractive candidates. "The Holy Grail in this national pilot problem is everybody needs right now, today, somebody to magically appear who has 10 years of aviation experience," said Col David S. Drichta, chief of undergraduate flying training for Air Education and Training Command (AETC).⁶ "That's what the airlines need. ... And, we need all of these same sorts of people to be the experienced pilots we require to do things like train new pilots and train graduate flight skills in our formal training units," he said.

The impact of a pilot shortage also extends past the flight line. The shortage affects the ability to fill numerous staff positions, where seasoned expertise is crucial in guiding programs and helping make big picture decisions. The Air Force has too few pilots at the headquarters, major command, and numbered air force levels. For institutional purposes, this matters a lot given that the service needs experienced perspectives to effectively manage its existing aircraft inventory, procure new systems, manage personnel, develop

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It is important to note that Air Force pilot experience is not interchangeable. Just as a plumber is not versed in an electrician's job, so too are skills different between bomber, fighter, mobility, and remotely piloted aircraft (RPA) pilots.

new concepts of operation, engage in professional military education, and advocate for Air Force perspectives. The very pilots who are leaving the service are a highly skilled group, and their level of informed perspective and insight is something that cannot be replicated for the Air Force. A well intentioned non-expert in a critical staffing position can cost the service millions through uninformed decisions that do not reflect real-world variables. Service leadership has had to sharply reduce the number of pilots on these staffs, especially fighter pilots, to keep the frontline squadrons manned at acceptable levels. As an example of the magnitude, the Air Force in 2017 reduced the total number of pilots assigned to rated, non-flying staff positions by 13 percent compared to 2016, Lt Gen Gina M. Grosso, the Air Force's deputy chief of staff for manpower, personnel and services, told House lawmakers in March 2017.⁷

It is important to note that Air Force pilot experience is not interchangeable. Just as a plumber is not versed in an electrician's job, so too are skills different between bomber, fighter, mobility, and remotely piloted aircraft (RPA) pilots. This has yielded problems as the service has tried to tamp the shortfall by pressing mobility pilots (i.e., tanker and transport aviators) into fighter pilot staff assignments.⁸ These skill sets are not always compatible, though, and the desired expertise is simply not present in many situations. Some staff billets can also be labeled incorrectly, according to Air Staff officials, where a billet says it requires a fighter pilot when in reality it does not specifically require the experience. This results in an inflated staffing bill to pay that also complicates pilot personnel management. The end result in many cases, though, is an erosion of expertise across the staffs, with money often wasted in the process and planning functions sub optimized. According to Grosso, the fighter pilot shortfall is particularly acute, with positions like planners at combatant commands, air operations centers, and training units, manned at 23 percent to 26 percent for fighter-pilot-specific positions, versus 79 percent to 84 percent in all other rated positions, she said. "Even with these reductions, the Air Force can

only fill 96 percent of fighter-pilot requirements at operational units," said Grosso. Given the number of fighter modernization efforts underway at present and the return of the high threat peer operating environment, which demands air superiority, this shortfall portends significant risk.

This overarching pilot inventory problem also impacts the full spectrum readiness of flying units, which poses long term capability concerns. Mission demands fall across a tremendously broad spectrum. Crews may find themselves deployed against terrorists one day, then expected to train against a peer adversary a few months later. The result of this practice stretches finite aircrew resources thinly. "What we are most worried about is that those [air]crews, when they come back [from places like Iraq and Afghanistan], are not ready for some of the potential high-end conflicts that we might face where there is integrated air defense and where we do have to fight in order to own the airspace over any potential adversary," Wilson told the Senate Armed Services Committee (SASC) in June 2017.⁹ "That is where the risk is. And, it is not that we would not surge to that fight, but the losses would be higher, and it would be a harder fight," she said. The attrition Wilson alluded to is a subject USAF leadership is most concerned about, and for good reason—as it currently has too few aircraft, and a shrinking number of aircrew to present a resilient force in a highly-contested shooting war where losses could be expected. It does not matter how skilled your force or advanced the technology, if too few are left to sustain missions.

To solve the pilot problem, the Air Force is adopting a two-pronged approach. "We're, first and foremost, looking to retain every [pilot] we can, as we build up our capacity to produce more," said Goldfein in November 2017. He called this a defense-offense strategy: first focus on pilot retention while, at the same time, gear up the Air Force's pilot-production pipeline over the next few years to train more aviators to fill empty flying positions. The Air Force is designing its retention efforts to enhance the quality of life of pilots and their families and improve the crews' quality of service by focusing them more on flying and less on non-mission-essential tasks. To augment those efforts, the Air Force is currently offering an aviation bonus of up to \$35,000 a year for pilots

who extend their service, and also working to help reunite pilots with the essence of why they serve and remain in uniform. “They stay because they want to work with the most the most amazing people, with the greatest technology, to have a mission that matters, and give their life meaning. That’s the value proposition,” said Goldfein. “If we’re going to retain these pilots, it’s going to be about reconnecting to the value proposition,” he said.

However, the immediate main thrust to stabilizing the manning crisis will be increased production of new pilots, said Air Force Brig Gen Michael G. Koscheski, director of the Aircrew Crisis Task Force at Air Force headquarters.¹⁰ “Our long-term fix to the pilot crisis is to grow our way out of this,” he said.

The increase in pilot production will be significant: some 25 percent, said Koscheski. That means increasing yearly output of pilots from the current level of 1,200 to 1,600 in the next few years,

with the interim step of reaching nearly 1,400 in Fiscal 2019.¹¹ That in-between milestone, 1,400, is important because it is the capacity the service wants to establish—and be able to maintain—for producing pilots internally, or “organically” for the long term. After the Air Force has recovered from the current pilot shortage, the idea is to retain the inherent flexibility in the training pipeline to be able to ebb and flow with the demands of the nation for rated pilots.¹² The

present tight tolerances in the pipeline do not allow the Air Force to surge pilot production—something that may prove crucial in a time of war if attrition becomes a factor. Post-Cold War operations have long assumed a minimal loss rate in operations, but such an assumption is not the historic norm, nor is it a prudent baseline to forecast into the future when the service is flying its oldest inventory ever, in a world marked by burgeoning threats. This dynamic environment serves as the background for the future acquisition of the T-X Advanced Pilot Training Family of Systems (T-X APT FoS), the successor training aircraft to the T-38 fleet and its accompanying training infrastructure and systems. The success of the T-X APT FoS in the coming

years, will prove a vital component of the service’s future pilot training reform and transformation efforts, and crucial to enabling resiliency.

In the nearer term, for pilot output to reach 1,600 a year, the Air Force is looking at outside help, which could mean using contractors or entering into new partnerships with public or private flying-training organizations. It could also adopt cutting-edge training methods that utilize technology like augmented or virtual reality. “We are exploring all ideas on how to produce more pilots and to do it faster and do it better with all of the innovations and technology that is out there,” said Maj Gen Patrick J. Doherty, commander of 19th Air Force at JBSA-Randolph, Texas—the numbered air force that oversees the pilot training enterprise.¹³

To churn out the greater numbers of new pilots, the Air Force may have no choice in the near term but to accept operational risk by pulling some experienced pilots from its frontline fighter units and inserting them in the training pipeline to instruct. Flowing more students demands more instructors. By doing so, Air Force leadership thinks it will be able to stabilize its pilot shortage by the end of Fiscal 2024, combined with near term retention efforts and subsequent ramp up of pilot production.¹⁴

Despite these efforts, the service does not expect the shortage to go away by 2024. This highlights how important the pending award of the APTFoS is as a part of any enduring solution to USAF pilot production challenges. When examining all aspects of the pilot and aircrew problem, one truth is clear as the Air Force pushes forward: business as usual is not going to work. Treating the pipeline holistically and removing seams, not just moving them around, is essential for efficiency and a lasting solution.

The Current Pilot Crisis, In Context

Despite the current status quo, the Air Force has weathered pilot shortages before. “This is not unprecedented; this is cyclical,” said Richard I. Wolf, director of the Air Force Historical Studies Division at JB Anacostia-Bolling, DC.¹⁵ “I have been doing this 35 years and I have seen the ups and downs. Indeed, the Air Force has found itself short of pilots just about each decade since its inception in 1947, said Wolf. “This happens whenever the economy is good,” he said. During these cycles,

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the Air Force has seen its pilot inventories swing between sizable deficits and then surpluses. Despite this, leaders should not interpret the trend as a call to wait for the cycle to reset itself. Each shortage demanded deliberate action, and so too is the case with today's shortfall.

One stark difference today is that in the past, the Air Force was larger in size and that made withstanding periodic pilot shortages easier (see sidebar). "You could have a unit be non-mission-capable because you didn't have enough pilots for it and, in a sense let it sit in a not-ready-to-fly

state, because you kept the others that are on the front lines ready," he said. "Now, we don't have any excess. We are a lot closer to that line where we just have enough forces. And, of course, it doesn't help when you keep them all occupied in combat constantly because you make it less desirable for people to stay," he said. With a far reduced end strength today, the Air Force concurrently faces a record number of high demand, low density flying mission sets. That means available forces must be capable of giving 100 percent, as there is no "Plan B" force structure.

USAF's Pilot Force, Through the Years

After World War II, the then-Army Air Forces drew down significantly, destroying or mothballing thousands of combat aircraft and slashing its pilot corps by demobilizing thousands of pilots. When the Korean War broke out in June 1950, the now-independent Air Force had a need to surge its pilot ranks rapidly to fill a 25 percent shortage that emerged when its requirement more than doubled within the next year.¹⁶ "A voluntary recall of World War II veterans and a strong aviation cadet pilot training program combined to alleviate the pilot shortage in few brief months," wrote then-Lt Col John D. Rhodes in a February 1986 Air War College report.¹⁷

The Air Force's pilot inventory during the Vietnam War is another instance of the cyclical nature. After the United States began significantly ramping up its military engagement in Vietnam in 1965, the Air Force again found itself in need of greater numbers of combat pilots. It went from having a surplus of 2,249 Active Duty pilots (six percent above the requirement) in 1966 to a deficit of 7,753 pilots (17 percent below the requirement) in 1967, due in large part to its pilot requirements burgeoning by 8,000, from 38,200 in 1966 to 46,200 in 1967.¹⁸ To address this, the Air Force began significantly ramping up pilot production, going from graduating 1,969 new Active Duty pilots in 1966 to a peak of 4,032 in 1972, the same year that the Air Force eliminated the shortage.¹⁹ The service then experienced a surplus of rated pilots from 1972 to 1978. The Air Force's requirement for pilots sharply sank from the peak of 46,200 in 1967 down to 21,078 in 1978; commensurately, its pilot-production levels heavily dropped from the 1972 peak to 1,047 in 1979. That same year began a decade-long cycle of the Air Force running deficits in its pilot inventory of about five percent or less, with pilot-production numbers and inventory requirements stabilizing in the mid -1980s around 2,100 and 24,300, respectively.²⁰

The early 1990s started a cycle where the Air Force actually found itself with too many pilots. With the end of Operation Desert Storm and the subsequent conclusion of the Cold War in 1991, the Air Force, and US military overall, began a significant drawdown. The Air Force found itself in the position of being able to reduce its force structure levels faster than it could shrink its manpower levels, including the pilot inventory and pilot-training output. As a result, through 1993, it produced a pool of "bank pilots." They were Airmen who completed pilot training, but had no flying positions waiting for them. Instead, they had to wait several years, working in non-flying assignments until a flying slot opened. The pilot surplus peaked in 1993 at nine percent.²¹ As one of the steps to shrink the surplus, the Air Force reduced pilot production, graduating only 480 pilots in Fiscal 1995.²² The comparatively low levels of new pilots produced subsequently led to another shortage that emerged in Fiscal 1998. After the Sept. 11, 2001, terror attacks, the Air Force had to surge operations once again. In the initial stages of the wars in Afghanistan and Iraq in October 2001 and March 2003, respectively, the Air Force enacted stop-loss provisions for months-long periods to keep its force levels up, including pilots.²³

Because of the challenge inherent in the Air Force's current end strength and spread of missions, Goldfein has taken the initiative to respond to this unsustainable status quo by standing up the Aircrew Crisis Task Force. Koscheski, appointed director of the task force in August 2017, works directly for the Air Force Chief of Staff, has no time-limited mandate, and reports to the Air Staff's operations, plans, and requirements office (A3).²⁴ "We have got a lot of folks and a lot of organizations across the Air Force working this problem," said Koscheski, noting that his role is to coordinate those activities and ensure everyone is "going the same way." The task force is pursuing numerous initiatives grouped into seven lines of effort to resolve the shortage, as of late 2017: requirements (e.g., number of rated staff positions), accessions, production, absorption (i.e., seasoning new pilots in operational squadrons), retention, sortie production, and industry collaboration.

Defining the Crisis Pilot Shortage

In sheer numbers, empty pilot positions represent the largest deficit among the aircrew professions. By far, the most acute scarcity within the pilot community is with fighter pilots. At the end of Fiscal 2017, the Air Force had approximately 21,000 pilots across its three components, some 2,000, or nine percent, short of its requirement for 23,000.²⁵ That deficit spanned the Active Duty, Air National Guard, and Air Force Reserve Command components and included about 1,800 empty pilot slots across the manned aircraft fleets and about 200 vacant pilot positions in the remotely piloted aircraft force.²⁶

The majority of the empty manned pilot slots were in the fighter community, which had 1,300 positions unfilled, including nearly 1,000 in the Active Duty USAF.²⁷ With a requirement for some 5,300 fighter pilots, that meant the Air Force found itself with only about 75 percent of the fighter pilots it needed to fill frontline units, train other pilots, and serve on major command, numbered air force, and headquarters-level staffs. Compared to Fiscal 2016, the overall shortage in Fiscal 2017 increased by approximately 100 pilots across the manned and remotely piloted platforms. While the shortage grew across manned

platforms—with the most-severe negative trends among bomber and mobility pilots—manning improvements in the RPA force offset that loss.²⁸ At the end of Fiscal 2016, the total shortage was 1,555 pilots across the three components, covering just the manned fleets not the RPA force.²⁹ Of that total, the fighter community was short 1,211 pilots, including 873 Active Duty fighter pilots.

The 1,300-pilot deficit in the fighter force also has varying levels of significance: The Air Force is not just short many fighter pilots; perhaps more disconcerting, the service is having a tough time retaining seasoned fighter pilots. It is important to note that there is a big difference between a veteran line airmen, versus a newly-graduated pilot. The former is ready to fly in combat, no questions asked. The latter is not, and actually requires additional unit time and energy to season with necessary operational skills. Air Combat Command (ACC) head Gen James M. "Mike" Holmes in November 2017 characterized this situation as "an experienced 11F crisis."³⁰ The Air Force uses "11F" as the career designation for fighter pilots, many of whom serve under ACC, but others of whom are assigned to flying positions with Pacific Air Forces, US Air Forces in Europe, the Air National Guard, and Air Force Reserve Command. A shortage of experienced fighter pilots also means the Air Force does not have enough instructor pilots (currently, USAF's instructor pilot manning stands at 64 percent as of early calendar year 2018, according to Air Staff officials). These pilots are always a valuable commodity, even more so when there are plans to ramp up pilot production significantly.

Despite the numbers, Air Force officials do not indicate the service is finding it hard to attract young Americans who wish to be pilots. "Recruiting and getting people on to fly is not a problem," said Lt Gen Mark C. Nowland, USAF's deputy chief of staff for operations, in a speech at Nellis AFB, NV, in January 2017.³¹ "If you look across the Air Force, the quality of the individuals coming into the Air Force are some of the highest we ever had," he said. The Air Force Recruiting Service (AFRS) has roughly 100 Officer Training School accessions slots for pilots available each year on average.³² "We have plenty of individuals who come to us wanting to be pilots," stated Air Force Recruiting Service spokeswoman Leslie Brown.³³ AFRS has "never

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had an issue filling those slots,” she said. These slots are also additive to the pilot candidates supplied via the US Air Force Academy and Reserve Officer Training Corps.³⁴ That said, there is still a need to ensure young Americans are aware of an aviation career path and motivated to choose a military aviation path of service after college.

The Pulling Factor of Economic Opportunity—

The challenge, then, is not one mainly of recruitment, but keeping these pilots and aircrew in the service. Therefore, we must look at the other end of the cycle: retention. Today’s Air Force pilots face a number of challenges. Going back to the service’s founding in 1947, never before have so few airplanes and aircrews been tasked with such a broad number of missions. High demand, low density missions are a way of life for today’s airmen, and the garrisoned force of the Cold War is a historical memory for most. The current Air Force has been a service at war, and constant deployment, since 1991’s Operation Desert Storm. As one separated pilot noted, “When I joined I knew I would always be preparing for war. I

just never expected I would always be going to war. That’s all I’ve known... I’ve served and served enough and I’m proud of that.”³⁵

When the demands of the Air Force get to be too much, though, airmen have options—and many exercise them. Commercial airlines are hiring in significant numbers, and actively recruit former military aviators with years of flying experience.

Among the major US carriers, hiring began accelerating in 2014 (3,053 pilot hires, up from 1,084 in 2013) and has been steadily rising since (2015: 3,429; 2016: 4,113).³⁶ These airlines brought in 4,988 pilots in 2017, the most by far since 2000.³⁷ Such high hiring levels are expected to continue. “The airlines project that they are going to require 4,500 pilots a year for the next 10 years,” Goldfein told the Senate Armed Services Committee in June 2017 during a hearing on the service’s posture.³⁸ The need for so many new airline pilots is due not only to the significant growth of the airline industry, but also to a looming bow wave of mandatory retirements for airline pilots

turning 65. “That what’s different this time than in previous pilot crises,” said Koscheski. Airlines have to hire to replace retirees, but they are also growing and expanding operations around the globe.

Boeing predicated in a July 2017 study that the global airline industry would double in size—from 23,480 total aircraft to 46,950—by 2036.³⁹ Boeing also forecasted that the world’s commercial aviation industry would require approximately 637,000 new pilots out to 2036, including some 117,000 new pilots in North America alone.⁴⁰ As for the forthcoming retirement wave, financial industry analysts estimate that the five largest US carriers (American Airlines, Delta Air Lines, United Airlines, Southwest Airlines, and Alaska Airlines) would see 42 percent of their pilot force retire by the end of 2026: some 21,650 pilots.⁴¹ Retirements will accelerate in 2021 and peak in 2025. American Airlines alone will see more than half of the approximately 14,500 pilots in its force retire through 2026, about 790 each year on average.⁴²

These developments dramatically affect the Air Force’s ability to retain its pilots. “History says the single-most relevant factor to pilot retention in the Air Force is how much the airlines are hiring. If you go back and look across time, you will see that’s the factor that matters the most,” said ACC’s Holmes. The spike in airline hiring comes at a time when the Air Force has endured significant cuts in force structure and manpower while supporting uninterrupted combat operations for the past 17 years in places like the Middle East, Afghanistan, and parts of Africa. In addition, major rotational presence of Air Force assets has ramped up in Europe and the Asia-Pacific since 2014, to counter Russian and Chinese activities. The impact of that confluence is evident. By the end of Fiscal 2015, the Air Force was some 510 fighter pilots short of its requirements.⁴³ In spring 2016, service officials were projecting the shortage would grow to 800 by Fiscal 2022.⁴⁴ The fighter-pilot shortfall at the end of Fiscal 2017 already grew to nearly 1,300—far exceeding early projections.

Air Force leadership has conceded the demand from the commercial section was not unexpected. “I would not say we were surprised,” said Goldfein at a June 2017 Senate hearing. The numbers that airlines were going to require “we had

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not seen coming,” he said. Indeed, a congressionally initiated study that RAND conducted in 2016 modeled “a potentially large growth” in airline pilot hiring over the next decade by using notional hiring levels between 3,200 pilots and 3,800 pilots per year and an average 13 percent increase in salary annually for the pilots. Grosso, the Air Force’s deputy chief of staff for manpower, personnel, and services, told a House oversight panel in March 2017.⁴⁵ In reality, the airlines’ actual pilot hiring and salary increases in 2016 surpassed those predictions, including the 4,100-plus hires, along with a 17 percent salary jump. For the commercial airlines, separating Air Force pilots make for highly attractive pilot candidates “because of their proficiency, diverse experience, and the standardization and quality of military aviation training.”

For Air Force pilots eligible to separate, the commercial sector is an alluring option. The air carriers can offer a high level of income and attractive benefits, along with predictable work schedules and more time at home for them to settle into a nice work-life balance and meet family commitments—not to mention no longer having lengthy overseas combat deployments. “I would say if you ask a second-assignment captain, you’ll get a different answer than if you ask a third-assignment major,” said Lt Col Langdon O. Root, Aircrew Crisis Task Force retention line of effort lead, when discussing the potential appeal of an airline job.⁴⁶

“A second-assignment captain doesn’t have enough hours to go to the airlines and probably doesn’t have kids in middle school and is probably not looking at college expenses a few years away,” he explained. However, for pilots who are majors or lieutenant colonels, priorities may be different. “They are looking at the airlines, which are paying \$150,000 a year in your second year, and that number is going up. A 15-year captain at Delta makes \$350,000 a year in total compensation once you figure in 401ks and profit sharing and all of that stuff,” said Root. “So, they are looking at this thinking, ‘Am I doing the right thing for my family?

Am I being incompetent by not taking advantage of this quality-of-life bump and this opportunity to pay for my kids’ college?’ Then, you combine that with the fact we’ve been at war for 27 straight years with a shrinking force with fewer people,” he said. These propositions are strong pitches for experienced and stressed career pilots who are deciding on their future in a military service under severe budgetary and operational strain. The US can only ask a pilot to fly on a combat footing so many times, and to do so in aircraft that are over fifty years old in the case of some bombers and tankers, or fighters that date back to the Reagan Administration.

Though pay is only one factor in the pilot retention challenge, it is one of the primary drivers for these pilots evaluating their careers. In order to provide dimension to strictly pay factor differentials, we must examine a commercial airline pilot’s earnings with the compensation that an Air Force fighter pilot is receiving at the end of their 10-year service commitment as they assess separating from the service.

Airline pilots are paid by the hour; their salaries vary depending on their employer, the number of years with the airline, and type of aircraft they fly. Normally, pilots at the major commercial carriers earn more than pilots flying for regional airlines. Most air carriers guarantee a minimum number of hours that a pilot will fly each month; those minimums can diverge much, but, generally, the sweet-spot for the minimum lies around 75 hours a month.⁴⁷ The hourly salary of a pilot with American Airlines, the largest US carrier, in 2018 ranges from \$156.00 to \$323.00, with an average of \$269.00, according to data assembled by Airline Pilot Central, an online airline pilot forum.⁴⁸ Applying the minimum of 75 hours per month, the average American Airlines pilot would earn \$242,100 in salary for the year. For the top carriers, the salary ranges from \$175,500 to \$244,800.⁴⁹ This does not include the per diem the pilot receives to offset on-the-job expenses; it also does not factor other benefits like healthcare, holiday pay, profit sharing, and retirement plans.

Comparatively, fighter pilots work far greater hours and have no choice with regard to longer term family separation. Using Fiscal 2017 pay tables, an Air Force major at ten years of service is earning

“Retention matters because young guys can’t fly unless there is an experienced guy on their wing,” said Root of the Aircrew Crisis Task Force. If a squadron has too many novice pilots, the few experienced airmen will be stretched thin trying to build pragmatic skills in their junior counterparts.

\$82,648.80 a year in base pay, \$8,400.00 in aviation incentive pay, and receives \$3,043.56 in a non-taxable basic allowance for subsistence (BAS), bringing the total to \$94,092.36.⁵⁰ The major also receives a non-taxable basic allowance for housing (BAH), which reflects local-area costs of living and varies in amount depending on the base to which the pilot is assigned and whether the pilot has dependents.⁵¹ Assuming dependents across a range of Air Force bases, total compensation ranges from \$116,800 (an F-22 pilot assigned to JB Langley-Eustis, VA) down to \$110,800 (an F-15E pilot at Mountain Home AFB, ID). Similar to the computations stated for airline pilots, these earnings do not include other benefits airmen receive like healthcare, retirement plan, and commissary and base exchange access. In this comparison, the Air Force pilot could receive the added annual payments of \$35,000.00 in aviation bonus pay, depending for how long the pilot re-upped, for up to 13 years. The pilot could choose to stay in the Air Force for another 10 years, but even a promotion to lieutenant colonel or colonel does not close the gap in salary and benefits.

Interviews with recently separated Air Force pilots highlighted factors that go beyond salary comparisons, as attractive as the income differential may be. Both separating pilots and the Air Force are aware that monetary benefits do not capture the value proposition that Goldfein emphasizes. It is also significant, according to some former and current pilots, that while the Air Force is not able to match the monetary compensation levels of commercial airlines, the service is by and large a secure and more predictable career path for a pilot—less prone to economic disruptions that can lead to furloughs in commercial aviation.

Unanimously, former pilots interviewed for this study ranked comradery, being part of an Air Force squadron team, and a desire to serve as the most missed aspects of their time in the service. At the same time, most were critical of efforts made by their chain of command to reduce or postpone service demands that were affecting family and

marriage stability, ability to remain collocated with working spouses, and other factors more prescient than in past generations of Air Force pilots. These stresses have only grown in severity as the post-Desert Storm operations tempo has ground on, year after year, and the service’s inventory of aircraft continue to age past their prime.

Retention: Dealing with Push Factors

While better pay, working hours, and stability offered by commercial aviation are pulling pilots to separate, Air Force leadership is hoping that the quality-of-life and quality-of-service improvements will motivate experienced pilots to stay in uniform, and help keep valuable institutional knowledge in the force, allowing it to regenerate by being passed along to younger pilots.

This is a critical factor, since experience counts in the cockpit—a newly graduated pilot simply lacks the experience required to be competent in a demanding combat situation. Freshly graduated airmen draw a tremendous amount of energy from more experienced fliers when they first join an operational squadron, because their training must continue. Flight school may teach them how to take off and land, but real combat training is something that happens in an operational unit.

“Retention matters because young guys can’t fly unless there is an experienced guy on their wing,” said Root of the Aircrew Crisis Task Force. If a squadron has too many novice pilots, the few experienced airmen will be stretched thin trying to build pragmatic skills in their junior counterparts. “So, our retention efforts directly impact absorption and production,” he said. Given the reality of the situation today, “we need everyone to stay for as long as they want to stay,” said Root. “For fighter pilots, we need 100-percent retention for the next decade. We need you,” he said. Root later added a caveat, noting that if the Air Force can’t increase its fighter pilot production and absorption enough, it will then need to retain 100 percent of its veteran pilots eligible for bonuses in order to meet requirements. The Air Force spends a lot of time and money training its pilots, especially fighter pilots. In fact, on average, it takes about two years and costs some \$10.4 million to produce a fighter pilot.⁵² That includes specialized undergraduate pilot training (approximately \$1.5 million), the

Though it must carefully balance between prioritizing flying assignments and valuable staff assignments for pilots (where vital leadership and policy influence is cultivated across the US military and national security establishment), the Air Force is working to reduce requirements that are not primarily connected to flying operations.

introduction to fighter fundamentals course (\$400,000), and instruction at a formal training unit (\$8.5 million).⁵³ That is an investment service leaders do not wish to see lost when pilots separate. Goldfein made this point during the November 2017 press briefing. Referring to the nearly 1,000 Active Duty fighter pilots that the Air Force found itself short of at the end of Fiscal 2017, he said: “That’s \$10 billion of capital investment that just walked out the door.”⁵⁴ Nor can it be reconstituted at the flip of a switch.

The experience factor highlights one of the underappreciated aspects of the pilot shortage issue: most retention measures the Air Force is working are non-monetary. While some lawmakers have chided the Air Force for seemingly thinking it could solve the pilot shortage through retention bonuses alone, Air Force leaders have been clear that they realize they cannot solely use money to entice pilots to stay. “We are going after both quality of service and quality of life because we are not going to buy our way out of this with money,” Goldfein told the SASC in June 2017. “There is no way we are going to ever be able to,” he said. Nonetheless, a few initiatives do involve money, like the newly increased aviation bonus, to augment those other initiatives. “We can’t afford not to compensate our talented aviators at a time when airlines are hiring unprecedented numbers,” said Secretary Wilson in August 2017.⁵⁵

Though it must carefully balance between prioritizing flying assignments and valuable staff assignments for pilots (where vital leadership and policy influence is cultivated across the US military and national security establishment), the Air Force is working to reduce requirements that are not primarily connected to flying operations. For example, the Air Force is cutting back on mandates requiring fighter pilots to fill 365-day deployments, among other initiatives. It is also reducing off-station exercises, eliminating training courses that are not mission-essential, bringing in support staff to relieve the administrative duties

that pilots have in flying units, and creating flexible options for developmental assignments that reduce involuntary separations from family.⁵⁶

All this is meant to give pilots more time to focus on flying and make it so they do not have to spend so much time away from family and face so many high-paced demands when they are at home station. “This is about revitalizing the health of our squadrons,” Goldfein told the SASC. “We are working on ways that we can create space in the calendar” for pilots, he said, adding that “pilots who do not fly are not going to stay.” That latter point is especially important for Congress to note, for sequestration-era budgets and continuing resolutions continue to ravage flying hour accounts and crucial modernization initiatives. Airmen clearly observe all of this playing out, and they must then pay the price.

In another quality-of-life move, the Air Force in September 2017 announced the Second Assignment In-Place Pilot (SAIP) Program for Active Duty aviators, including late-career fighter pilots.⁵⁷ Under it, up to 100 of them serving at one of 16 Air Force bases—10 of which are AETC pilot-training locations—will be able to extend their stays at their current assignments beyond their current tour of duty by up to three years.⁵⁸ That means experienced instructor pilots would keep training new pilots. “We asked our aircrews for feedback and learned that late in their careers, people want stability for their families,” said Nowland, the Air Force’s deputy chief of staff for operations.⁵⁹ “This program gives our Airmen an opportunity to create stability in their personal lives while ensuring we don’t lose the expertise they’ve gained,” he said. The AETC bases under this initiative include its undergraduate pilot-training locations.

The Air Force is also exploring modifications to the Career Intermission Program to allow pilots to take a one- to three-year break and go to work for a commercial airline to get a foot in the door, and then return seamlessly to service duty.⁶⁰ Also, under an effort called the Follow-On Assignment Program, pilots who are tapped for a restricted short tour (such as a stint at a base in South Korea, or a posting to a location in the Middle East) can receive advanced consideration for their follow-on assignment back in the US. This allows a pilot’s

family to plan moves more deliberately, retain more stability with regard to their job and family obligations, and remain in their current location until the airman returns stateside.

One of the principal monetary measures aimed at retaining experienced pilots is the aviation bonus program that aims to encourage airmen who are on the verge of fulfilling their 10-year initial service commitment to stay in uniform. Language in the Fiscal 2017 defense authorization act allowed the Air Force to increase the bonus for the first time since 1999, from a maximum of \$25,000 a year to \$35,000.^{61, 62} Since initial take rates were lower than what the Air Force needed, service officials subsequently expanded the bonus program to include a wider pool of pilots like those beyond their initial service commitments who previously declined to sign long-term bonus contracts and those with expired contracts.⁶³ Aviation incentive pay, or “flight pay,” also rose for the first time since 1999 in October 2017, increasing from a maximum of \$850 to \$1,000 per month.

The Air Force also is mulling ideas like creating a flying-only career track for pilots in some fields like mobility, but it must carefully balance these slots with wider service needs for valuable staff billets which must be filled by airmen to provide the key perspective of a career pilot. In some cases, a flying-only track would mean pilots could avoid staff positions and instead spend their careers in flying assignments.⁶⁴ Over their career progression, they might move from flying combat-ready transports to distinguished visitor shuttles, perhaps to serving as flight instructors.

But pilot-only billets are not a panacea, and Goldfein has made sure to stress this point. “We are looking at it,” Goldfein told the SASC in June 2017. “But I also want to make sure that we are clear. If you put a piece of paper in front of Captain Goldfein and said, ‘Listen, captain, if you want to stay flying and never do anything else, all you got to do is sign here and you will never make it past lieutenant colonel,’ I would have signed it in

a second,” explained Goldfein, using his younger self as an example. “That is exactly what our young captains feel like. But then we give them a leadership position and they understand what it feels like to actually lead young men and women into combat, and, hopefully, we hook them. And so, there are some things in a career that we want them to do. While we are looking at different tracks, what I do not want to do is to have young officers who have not had the chance to actually show what they are made of relative to leadership, opportunities,” he said. “I want to make sure that we do not close doors to those young officers who may find that they actually can be great chiefs of staff someday,” he added. Nor is it just about the airman’s personal growth—the Air Force needs their informed perspective in the staff process. There are certain types of experience you have to garner outside the beltway of Washington, DC—that can only happen in an operational flying unit.

The Air Force has considered flying-only tracks in the past, but not executed them, said Wolf, the historian. Part of the reason this solution has gained little traction is the long-term effects of withdrawing a portion of the force from staff and leadership positions: the institutional Air Force will suffer by having its interests underrepresented at combatant commands, on staffs, and at the highest levels of military leadership where staff positions are vital to preserving the Air Force’s voice in joint discussions. If the Air Force is trying to explain why a certain policy option may prove favorable, it needs someone with operational credibility making the case. Goldfein’s comments hint at this tension and explain why the Air Force is moving judiciously with regards to flying-only tracks.

Thus far, Air Force officials publicly indicated no pending action to employ involuntary measures, such as stop-loss authority, to retain pilots eligible to separate or retire. “As I understand, the Air Force currently has no plan or intent to initiate stop-loss—they are currently able to accomplish the mission without invoking stop-loss and are taking steps to grow our way out of the pilot shortage before this crisis prevents us from meeting combat mission demands,” wrote then-nominee Shon J. Manasco in his responses to the Senate Armed Services Committee’s advance policy questions to him prior to his nomination hearing on Nov. 9, 2017, to be

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the Air Force's assistant secretary for manpower and reserve affairs (the Senate confirmed Manasco later that month).⁶⁵ "Of course, an additional major theater conflict has the potential to change the math in this discussion. Based on my prior military service I believe stop-loss can sometimes provide short-term relief for urgent critical needs; however, I do not believe it is a good option for dealing with long-term issues," he said. Through the end of 2017, Manasco's statement still reflected the Air Force's position.⁶⁶

Instead, Air Force officials are hoping to entice recently retired pilots to return to uniform voluntarily, perhaps up to 200.⁶⁷ Under the Voluntary Rated Return to Active Duty (VRRAD) program announced in August 2017, the Air Force is seeking retired pilots who left the service within the past five years to return to service freely for a period of up to four years, primarily to fill rated, non-flying staff positions at commands, headquarters, and other billets stateside that require a pilot's expertise.⁶⁸ However, some may also go to training units to serve as instructor pilots, Nowland told the House lawmakers in November 2017. Their presence would allow current and qualified pilots to remain in operational units where the Air Force needs them. As of early February 2018, the Air Force had received 47 applications; officials were processing 21 of them and considering those individuals for entry to Active Duty.⁶⁹

Although near-term efforts, these retention activities will need some time to settle in and take effect. The Air Force would realistically like to retain 65 percent of its pilots who are eligible to leave the service; that is the benchmark. In Fiscal 2015, the take rate for the aviation bonus was 55 percent for all eligible pilots and 47 percent for fighter pilots.⁷⁰ In Fiscal 2016, the rate was 48 percent and 40 percent, respectively.⁷¹ Of the eligible pilots in Fiscal 2017, the overall pilot take rate was 44 percent and for fighter pilots was 35 percent. Even with the hike to the aviation bonus, retention continued to fall. Thus, officially, at the surface level, the \$35,000 bonus "had zero impact on retention" in Fiscal 2017, said Root. However, there is some silver lining: Fiscal 2017 was the first

year the Air Force offered the one- and two-year re-up contracts and 118 pilots signed up for those two options. The reason for offering them, said Root, was to buy some time to show those pilots that the Air Force is serious about making the quality-of-life and quality-of-service improvements and perhaps bumping up the aviation bonus even more. The idea was "give us a year or two to earn back your faith," he said. Air Force leaders have said they would evaluate the aviation bonus program's effectiveness and work with Congress to make adjustments, as warranted.

RAND Corporation analysis suggests that the annual aviation bonus would need to be about \$65,000 for the Air Force to meet the retention goal of 65 percent, said Root. That amount assumes that the Air Force relied solely on the bonus to retain pilots and did not undertake other quality-of-life and quality-of-service changes, which is not the case. The amount is based on forecasted hiring trends and compensation packages at the major airlines. What the Air Force has been trying to push is a \$50,000 package that would allow it to tier the aviation bonus, incentivize the right categories of pilot to stick around, and give time to work the other retention initiatives, said Root.

Understanding the Pilot Pipeline

The process of becoming an Air Force pilot—and earning one's "wings"—normally takes slightly more than one year of dedicated training. Airmen who reach this goal have acquired the necessary aviation skills to qualify for the aeronautical rating of "pilot" based on the standards the Air Force has established. The wings are the badge pilots wear on their uniforms to signify their rating. The Air Force refers to pilots who have earned their wings and maintain their flying proficiencies as "rated" personnel.

But for newly minted pilots, carrying the aeronautical rating doesn't mean they are ready to fly off to combat yet in the Air Force's most sophisticated airplanes. They still must undergo more intensive instruction to get to that point. Indeed, an airman generally requires about two years to advance from the start of pilot training to the point of being ready to step into the cockpit of an operational aircraft and execute a real-world mission.⁷²

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Overseeing the pilot-training pipeline is USAF's 19th Air Force at Randolph. The numbered air force manages all aspects of pilot instruction, including contractor-operated initial flight training (IFT), the Air Force's four specialized undergraduate pilot training (SUPT) bases where students earn their wings, and the graduate-level formal training units (FTUs) where new pilots gain proficiency in a particular aircraft type, such as the F-35A Lightning II stealth fighter or the C-130J Super Hercules transport.

For newly commissioned second lieutenants fresh out of graduating from the US Air Force Academy, Officer Training School, and Reserve Officer Training Corps, the pilot journey begins with initial flight training at the L3 Doss Aviation (formerly Doss Aviation) facility at Pueblo Memorial Airport in Pueblo, CO.⁷³ This is the first step of undergraduate pilot instruction; AETC refers to it as SUPT phase zero. Nearly all Airmen who are on the path to becoming pilots of fighters, bombers, helicopters, intelligence-gathering platforms, tankers, transports, special-mission airplanes, and remotely pilot aircraft (RPA) start

off at IFT, which is dubbed the "gateway to Air Force aviation." Airmen training to become combat systems officers to serve as onboard mission commanders for navigation, weapons systems, and electronic warfare also start off in Pueblo.

It is in the IFT block where the Air Force has shown some willingness to experiment with contractors in fulfilling training needs, and its experience with this approach presents some useful lessons when evaluating how to improve pilot production. L3

Doss Aviation owns and operates the IFT facility, providing the curriculum coursework, flight training, and all supporting services. The company has run IFT since 2006; in January 2017, the Air Force awarded it a follow-on 10-year contract, building upon the success of the initial 10-year IFT arrangement. IFT is currently the only part of the pilot-training pipeline that is contractor-run; the Air Force operates the other components. L3

Doss Aviation has modeled IFT after Air Force flying training squadrons to provide the students with an experience that mirrors, as closely as possible, what they will encounter in the next phases of undergraduate instruction. This includes inculcating them with a mission-focused mindset in a military training environment. The underlying motivation here is to prepare them best so they face no surprises later on in the training pipeline, thereby increasing their chances of success.⁷⁴

After completing their 22 training days (for fixed-wing manned aircraft and helicopters; RPA pilot trainees spend 37 training days in Pueblo), IFT graduates generally move on to one of the Air Force's four wings that conduct the main parts of specialized undergraduate pilot training (SUPT): the 14th Flying Training Wing (FTW) at Columbus AFB, MS; 47th FTW at Laughlin AFB, TX; 71st FTW at Vance AFB, OK; and 80th FTW at Sheppard AFB, TX. The 80th FTW is unique in that it hosts the NATO pilot training program that instructs student pilots of the Air Force and NATO partners' air forces.⁷⁵

At the SUPT bases, there are three main phases of instruction: phase one, preflight; phase two, primary pilot training; and phase three, advanced pilot training. Together, they last about one year. Phase one covers 31 training days and features no flying.⁷⁶ Instead, it encompasses ground training in areas like emergency procedures, aircraft operating limitations, checklist usage, and local radio procedures as well as extensive time in the classroom learning aerospace physiology, flying fundamentals, introduction to aerodynamics, and discussion of the T-6's flight attributes. For phase two, students return to flying, using the single-engine, two-seat T-6, which the Air Force has been using in pilot training since 2000, completing 90 training days of academic and ground training and as many hours in flight simulators and in actual T-6 sorties.^{77,78}

At the end of SUPT's phase two, the Air Force directs the students, based on their performance, onto one of two main paths for phase three: the fighter-bomber track or the tanker-airlift track. Each track spans 120 training days. Students on the fighter-bomber track spend 95.5 hours flying the T-38 Talon twin-engine, supersonic jet trainer, which entered service in 1961. Those pilot trainees

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on the tanker-airlift track fly the T-1A Jayhawk twin-engine jet trainer, which the Air Force has used in flight training since 1993.⁷⁹ They spend between 58 hours and 78 flight hours in the T-1A cockpit, during this phase, along with many hours of academic and ground training and time in the simulator.⁸⁰ Not all student pilots go through phase three on one of those tracks at a main SUPT base. For example, helicopter pilot trainees shift to Fort Rucker, AL, for the rotary-wing fundamentals course, which is their phase-three instruction.

Several weeks before completing phase three and graduating SUPT, the student pilots receive their “seat assignment,” which reveals to them the specific platform that they will fly operationally—and, correspondingly, the formal training unit they will attend for their follow-on, graduate-level pilot training. The Air Force determines which platform

a pilot will operate out of training based on the pilots’ class rankings, training performance reports, and instructor recommendations, along with the Air Force’s needs and each pilot’s personal preferences.⁸¹ Upon graduating SUPT, the students receive their pilot’s wings. At this point, the new pilots take on a 10-year commitment to serve in the Air Force; for new RPA pilots, the obligation is six years.

The new pilots move on to the formal training units (FTUs), which are also known as the “schoolhouses” for their respective platforms. At the FTUs, the pilots take a basic flight course to become qualified in their specific aircraft type, such as the

B-52H Stratofortress bomber, C-17 Globemaster III transport, E-3 Sentry airborne warning and control system platform, F-16 Fighting Falcon, or KC-135 Stratotanker. That is the general model, but it varies depending on the platform. For example, Air Force Special Operations Command (AFSOC) operates many small fleets of airplanes like gunships and transports for covert infiltration missions. Each has its own, sometimes unique, pilot-training path after SUPT.

The length of time pilots spend at the FTU is about six months on average but might be longer depending on the platform.⁸² New fighter pilots

have an extra, interim step that falls between undergraduate instruction and the FTU: the introduction to fighter fundamentals (IFF) course. It involves training in the T-38 once again. IFF increases the duration of a new fighter pilot’s graduate-level instruction by up to 12 weeks.⁸³ Columbus, Randolph, and Sheppard host the IFF course; the latter produces more than half of all Air Force fighter pilots.⁸⁴

After new pilots finally become qualified in their respective platforms, they progress to their first operational assignment, taking a flying position in a combat-ready squadron. Some new pilots become instructor pilots for their first assignments. They return to the training pipeline and instruct in the T-6, T-1, or T-38. The Air Force calls them first-assignment instructor pilots (FAIPs). For the non-FAIPs who go to a combat-ready squadron, they will continue to train at their unit and acquire new qualifications for the missions their squadrons execute. Over the course of a pilots’ careers, as they grow in experience and proficiency during multiple assignments, they receive more advanced aeronautical ratings, signifying their experience and ability in flight operations. These are: senior pilot (generally, at least seven years as a rated pilot and at least 2,000 total pilot hours) and command pilot (generally, at least 15 years of rated service and at least 3,000 total pilot hours). There are separate aeronautical ratings for RPA pilots.⁸⁵

Ramping Up Pilot Production

It is not difficult to see, after examining the pilot training and seasoning process, why the Air Force is focusing so much on retaining pilots—in particular, experienced senior and command-rated pilots.

As retention efforts take root, the Air Force is also gearing up for a significant ramp-up in its level of pilot-production output. As discussed, this effort will require at least several years to materialize and entails growing output from the level of about 1,200 today to around 1,600, with the interim step of reaching 1,400, the new organic-capacity goal. Airmen working the day-to-day pilot instruction at the training wings and all the way up to the senior leadership at Air Force headquarters said there is an open-mindedness and willingness to embrace outside-of-the-box ideas as well as past

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Air Force headquarters officials and Air Education and Training Command leadership said the service has not made the decisions yet on how to reach the production level of 1,600 pilots per year—but numerous options are under consideration.

approaches, when applicable, to shape the future of the pilot-training enterprise. “This would not have been palatable five years ago, what we are exploring now. There is zero pushback on ideas of thinking outside of our [training centers] to bring new ideas and creativity and innovation on how we produce military aviators for the future,” said Doherty, the 19th Air Force commander.⁸⁶ At the same time, when it comes to the training itself, they said there will be no compromises in the quality of instruction or safety. “None of this discussion is talking about dropping standards. We are talking about raising standards,” said Doherty.

USAF has already begun tweaking its pilot output rate, with an eye towards finding a rate that can meet demand without breaking the process. In Fiscal 2016, the Air Force trained roughly 1,100 new pilots. It increased total output to about 1,200 in Fiscal 2017, realizing that the training pipeline could not sustain this higher rate of production without more funding for aircraft maintenance and logistics and without more instructor pilots. It is now working to sustain that level in Fiscal 2018; Koscheski, the Aircrew Crisis Task Force director, said plans do call for a slight bump-up in output to about 1,225 in Fiscal 2018.⁸⁷ In Fiscal 2019, the Air Force wants to train “just shy of 1,400,” said Koscheski. “That’s the ramp-up,” he said. After that, “in Fiscal 2020 and out, we are going to grow to 1,600,” with “most of the big-dollar funding” for the reinvigorated pipeline coming in “Fiscal 2020 and out,” he said. “We want to have a mindset of experimenting, of beta-testing, of prototyping some ideas,” said Doherty. “So, we are probably going to lean into those in Fiscal 2019, but I think to bring those to scale will be Fiscal 2020 and beyond,” he said.

Air Force headquarters officials and Air Education and Training Command leadership said the service has not made the decisions yet on how to reach the production level of 1,600 pilots per year—but numerous options are under consideration. They include bringing on a contractor to run a portion of T-6 and/or T-1 training as a turn-key service (something the

service did with much success in World War II); embedding contracted instructor pilots with Air Force training units; forming partnerships—or strengthening existing ones—with universities, civilian flight schools, and training academies, including the creation of a national flight training center that would feed new pilots into both the military and commercial sectors; creating a dedicated track for undergraduate helicopter training, or embracing cutting-edge training constructs that leverage the latest advances in technology so that a substantial share of a pilot’s training occurs in simulators.

Informing these production decisions will be insights gained from an experimental course called Pilot Training Next (PTN) that AETC is launching in February 2018. The command is bringing together 20 students at the Reserve Center at the Austin-Bergstrom International Airport in Austin, TX, for the roughly five-month course. Command officials said PTN could help usher in a new learning construct of paradigm-shifting significance that costs less than the current pilot-training model; is more-individualized and student-centric; takes less time; and does not sacrifice depth or quality of instruction, perhaps enhancing them.⁸⁸ The goal of the Pilot Training Next course is to explore whether combining new and emerging technologies like virtual and augmented reality, advanced biometrics, artificial intelligence, and data analytics may result in a more-efficient training method. If the course proves successful, the participants may walk away with pilot wings in summer 2018, according to AETC officials.

AETC Commander, Lt Gen Steven Kwast, said he wants his command to leverage cutting-edge research on how the human adult brain works so that officials would be able to measure the learning habits of a high school or college student to gauge whether the student has the mental attributes that would make him/her an excellent military aviator.⁸⁹ If so, “then I can start giving [that person] some flying lessons and it actually helps me at cheaper price points to get them to a higher level,” he said. The same approach holds true for measuring persons with previous piloting experience. “It really comes down to the human mind and those attributes and competencies that

Unless, as Kwast discussed, new insights and innovations allow most pilot training to occur in a simulator versus the actual cockpit, the emerging requirements for greater pilot-training output could drive the Air Force to establish a fifth base for undergraduate pilot training.

make somebody good at this business that we don't measure right now that I am going to start measuring in order to give us insights," said Kwast.

Since the early 1990s, after Operation Desert Storm against Iraq, the Air Force's pilot-training enterprise has decreased in size. "This is really the first time [since then] that we have actively pursued growth across the entire enterprise on the pilot side," said Drichta, AETC's chief of undergraduate flying training.⁹⁰ "We have routinely cut capacity to the point of perfect execution and efficiency, and now it is time to grow and growing is difficult," he said.⁹¹ The last time the Air Force produced 1,600 new pilots a year, it had two additional SUPT bases and some 220 additional trainer aircraft, he said. "That tells you how much we have reduced our capacity over time and what level of effort it is going to take to get back to something like that," said Drichta.

How many pilots the Air Force can train depends on factors like the amount of available base infrastructure and airspace; number of trainer aircraft and their utilization rate; and sortie-generating opportunity made possible by good weather, window of daylight, and operating days. "The only way to increase production is to increase capacity in these areas," reads an AETC white paper on pilot training from September 2016.⁹²

Unless, as Kwast discussed, new insights and innovations allow most pilot training to occur in a simulator versus the actual cockpit, the emerging requirements for greater pilot-training output could drive the Air Force to establish a fifth base for undergraduate pilot training. The service could elect for this base to be a contractor-owned facility. While the existing four SUPT Air Force bases—Columbus, Laughlin, Sheppard, and Vance—have some room for expansion, Drichta said they could not provide the growth needed to support the service's overall ramp-up goal. "So, you are left vying for plant capacity at another Air Force base or another [Department of Defense] airfield or going to a contractor or a university or some flight training center and taking that plant capacity outside of the current [infrastructure]," he

said.⁹³ "That's a pretty massive thing that we are talking about doing," he said.

To better track and regulate the training pipeline, AETC is planning to stand up a Flying Training Operation Center at Randolph AFB, TX under 19th Air Force to ensure a smooth flow of pilot production. The center will allow for laser-focused oversight in the performance of all of the elements of the rated production pipeline, said Doherty. "It ensures the quality of instruction and that we are incorporating all of the greatest technologies and concepts," he said. The center's staff will have expertise across domains, such as maintenance, logistics, and contract acquisitions, he said. "We need to have the right people to identify issues quickly and early ... and produce a solution," said Doherty.

In another move to increase throughput, the Air Force is establishing two additional F-16 training squadrons at Holloman AFB, NM, on an interim basis to increase fighter pilot production at the FTU level.⁹⁴ They will boost the two squadrons already training F-16 pilots there. The Air Force chose Holloman because its existing infrastructure would allow for ramping up F-16 pilot training more quickly than bedding down the squadrons at another location. In August 2017, the 8th Fighter Squadron, the first of two additional training units, stood up.⁹⁵ The 27 F-16 Block 40s airplanes it will fly formerly operated out of Hill AFB, Utah, now home to F-35As. The Air Force's notional planning calls for bringing about 18 more former Hill F-16s to Holloman at a later time to establish the second squadron, said Brig Gen Brook J. Leonard, commander of the 56th Fighter Wing at Luke AFB, AZ, which currently oversees Holloman's 54th Fighter Group.⁹⁶ Since the Air Force has been short of Active Duty maintainers, it intends to use contract maintenance for these two squadrons, marking the first time the Air Force will bring on contractors for back shop maintenance of fighters, he said.

Maintenance and sustainment is also a critical factor in plussing up USAF's pilot production in the years to come. AETC logistics officials began taking steps in Fiscal 2016 to position the command for increased production, said Gilbert J. Montoya, the command's logistics director.⁹⁷ Unlike past decades, "We did not have that surge capability

In recent years, due to funding scarcity, the focus of AETC logisticians has been on efficiency and aircraft availability, but at the bare minimum level. “Because of that, there was less emphasis placed on overall fleet health,” said Montoya. Now, AETC is again stressing additional indicators like mission-capable rates and eliminating the proverbial “hangar queens.”

to, on a dime, be able to ramp up production,” he said. Previously, logisticians had to make “targeted investments” and look how to make the T-1, T-6, and T-38 fleets healthier overall. “The fleet is getting older, but for the most part, I think we can get healthy enough to get to that 1,400 number of production. Now sustainment, long term, is going to be our biggest challenge,” Montoya said. The T-1

fleet is still recovering from a hailstorm in February 2016 that damaged most of Laughlin’s Jayhawks, but Montoya said he thought the fleet would be able to support the Air Force’s increasing organic production goals. T-6 fleet health is strong; in fact, these airplanes are operating above their mission-capable-rate standard, he said. As for the T-38s, Pacer Classic III structural upgrades will help keep those airframes airworthy until T-X airplanes start replacing them, he said. Still, he noted, the T-38 fleet is “old, tired iron.” When maintainers open up a T-38 to perform an upgrade, they find “it’s beat up pretty badly,” said Montoya. His point is worth echoing—the T-38 was procured during the Vietnam War, and has been flown hard decades past its originally anticipated service life. Students are not the savviest of pilots and the operational scars on the aircraft attest to this reality. AETC, as of November 2017, had 178 T-1s, 444 T-6s, and 427 T-38s, the vast majority of which operate out of the four SUPT bases.⁹⁸

In recent years, due to funding scarcity, the focus of AETC logisticians has been on efficiency and aircraft availability, but at the bare minimum level. “Because of that, there was less emphasis placed on overall fleet health,” said Montoya. Now, AETC is again stressing additional indicators like mission-capable rates and eliminating the proverbial “hangar queens.”⁹⁹ This includes AETC “putting more teeth” into new contracts with its maintenance-services providers to reflect that renewed attention, he said. Improvements across the SUPT bases are evident. For example, in January 2016, the 47th Flying Training Wing at Laughlin had 38 T-6 hangar queens among its 103

Texan IIs.¹⁰⁰ Each of the 38 had not flown in more than 30 days; eight of the 38 aircraft hadn’t flown in more than three years, and one was nearing five years as non-mission capable. A concerted effort by the wing’s maintainers brought them back to mission-ready status, and as of December 2017, the wing had no T-6 hangar queens—meaning 38 additional T-6s available to support increased pilot production.¹⁰¹

By tweaking maintenance and sustainment practices, the Air Force is trying to get more production out of its existing training pipeline until it can bring on the new T-X system in relief. Currently at Laughlin, one of the four SUPT bases, the plan is in place to recover hail-damaged T-1s (from a 2016 storm) by September 2018, said Charles L. Webb, who heads Laughlin’s 47th Maintenance Directorate.¹⁰² The wing’s T-6s are in excellent condition, and its T-38s are “in decent shape,” he said. The base’s Talons are meeting their 60-percent mission-capable standard, said Webb, acknowledging that this MC rate is comparatively low. He thought 70 percent is “probably the upper level” of what the wing could achieve with increased maintenance attention. Nonetheless, he thought the wing’s T-38s would do their part to support AETC’s organic production goal of 1,400 pilots a year. Beyond that level would be different. “I don’t see how we could do 1,600 pilots with our T-38 fleet right now,” said Webb. “There are not enough airframes,” he said. The T-38’s engine is “the weak link from a maintenance perspective,” said Webb. That is because an engine modification of several years back has made the Talons’ power plants “a little harder to maintain,” he said. This is on top of existing maintenance issues with the circa-1960s T-38 fleet. In short, the T-38 is an old jet in need of replacement. The real answer lies in the form of the T-X replacement effort.

Much like the Air Force’s challenge with experienced pilots, Laughlin’s main concern from a logistics standpoint is having enough maintainers, said Webb. “From where I sit right now, we are right on the edge of maintenance manning. We don’t have a deep bench,” he said. “Experience is a challenge,” he said. Webb estimated that the 47th Flying Training Wing would need about 60 additional maintainers to support annual production levels around 1,400. The challenge

Short of quickly introducing tremendous technologically driven efficiencies into the training pipeline that would obviate the need for more of them, the simple fact is the Air Force must have more instructors to support higher output levels of new pilots each year.

is in defending that number as it works its way through Air Force decision-makers (in particular, the 47th FTW's logistics model is set up for wings with active duty maintainers, not Laughlin's civil service maintainer force, which poses challenges for authorization and funding). As of October 2017, the wing had justification for around 23 additional maintainers who are expected to arrive in Fiscal 2018 and Fiscal 2019, he said. That is well short of the 60 the wing requires.

There is also no formal technical school for new maintainers of the T-1s, T-6s, or T-38s, said Webb. "Right now, a new person comes in, and it is on-the-job training," he said. The setup "has held up OK, but it is certainly not optimal," he said. That is one of the reasons why Webb is eagerly awaiting the new T-X maintenance training center that AETC is establishing at Randolph, since maintainers of T-1, T-6s, and T-38s will also be able to go there for instruction.

The Need for Experience— Instructor Pilots

Instructor pilots are another critical component of the pilot-production equation. Short of quickly introducing tremendous technologically driven efficiencies into the training pipeline that would obviate the need for more of them, the simple fact is the Air Force must have more instructors

to support higher output levels of new pilots each year. Experience matters in this regard; it is exactly that breed of Air Force pilots who are at the end of their 10-year initial service commitment who make for excellent instructor pilots due to their high level of flying knowledge and wisdom.

That is one of the reasons why the Air Force is offering the retention bonus, and the quality-of-life and quality-of-service initiatives to keep these fliers around. The Air Force's challenge is that it is not alone in wanting these experienced pilots and there is a finite cadre of them nationally. "We are all counting on the same gene pool: the military, the airlines, the contractors," said Drichta, AETC's chief of undergraduate flying training.¹⁰³ "If the airlines are able to lure folks away from rated

service in the military, they filled their hole, but I have a hole," he said. "Or, if a contractor says they are going to deliver [a pilot-training] service, and then to deliver the service, they hire 50 of my instructors away from Active Duty, that didn't help," he continued.¹⁰⁴

However, it is a different story when discussing the one-third of pilots Grosso highlighted who separate from the Air Force, but do not join the commercial airlines. Those pilots would be "additive" to the equation if they returned in some way to instruct, as would anyone else who currently is not flying or instructing in the aviation industry but is "physically qualified by the FAA or the military to fly," said Drichta. It is not just flight instructors whom the Air Force needs; simulator flight instructors are also in high demand, he said.

The Air Force's shortage of experienced fighter pilots has affected the levels of instructors in the formal training units for fighters—a critical step in the pilot training program that hones key skills and competencies. "I have not seen manning this low in the FTUs my entire career," said Brig Gen Brook J. Leonard, commander of the 56th Fighter Wing at Luke AFB, AZ.¹⁰⁵ The unit is the Air Force's largest fighter wing; it is an FTU for the F-16 and the F-35A and currently includes the 54th Fighter Group (FG) at Holloman AFB, NM, which trains F-16 pilots. Leonard came to Luke in 1994 for the first time as an F-16 student pilot. Today the 56th FW is hovering around 65 percent in F-16 instructor manning, with the 54th Fighter Group below that at 55 percent, said Leonard.

The fact that the Air Force is standing up new F-35A training units is exacerbating that situation, he said. For instance, in Fiscal 2016, 220 pilots graduated from the wing's F-16 basic course; that number dipped to 181 in Fiscal 2017, and the wing projects it will rise slightly again to 189 in Fiscal 2018.¹⁰⁶ The drop-off had to do with the fact "we have slowly lost instructor pilots as we lost fighter pilots, in general, and we kept the operational units at 100 percent" and with the need to pull some F-16 instructor pilots to become F-35A instructors, said Leonard. While the wing's F-35A pilot production is increasing (Fiscal 2016: 55; Fiscal 2017: 74; Fiscal 2018 projection: 112), it has come, at least initially, at the cost of F-16 production, he said.¹⁰⁷

With the level of instructor pilots the 56th FTW had on hand, as of November 2017 (F-16: 160 US and international; F-35A: 76 US and international), it would not be able even to sustain a production rate that supports total Air Force output of 1,200 pilots a year, said Leonard.¹⁰⁸ Accordingly, for formal training units like the 56th Fighter Wing, this may leave the Air Force in the situation, at least initially, of having to accept more risk in its operational squadrons by shifting more-experienced pilots from them to training units to instruct, said Leonard.

Leonard equated this scenario with the “get-well” approach the Air Force has taken to stabilize its RPA force. That strategy involved reducing some RPA operational combat lines and applying freed-up operators to the RPA training enterprise, so as to train more new pilots and enable a more-steady state of RPA operations over the long term. “We have been losing fighter pilots, we have been getting fewer and fewer each year, and each year that number that we are short has continued to grow,” explained Leonard. “Hopefully soon, [the number] will stop growing and then start decreasing. But in that bottom of the bathtub, if you will, the first things you have to do is actually fill up your [training] force, get your pump fully operational, and then you can increase the capacity of that pump. But first, you have to get that pump up to at least normal operating speeds,” he said.

A fighter pilot who just graduated from their FTU needs about three years out in the operational force to gain enough experience to return as an instructor in a formal training unit, said Leonard. Accordingly, to increase FTU output sooner than that means drawing from an existing source of instructors and “the biggest pool of current and qualified folks with that level of experience” is in the operational units, he said.

As of Nov. 1, 2017, AETC had 1,624 instructor pilots spread across its undergraduate pilot-training units, introduction to fighter fundamentals squadrons, and the formal training units it controls.¹⁰⁹ AETC officials said they were

still evaluating how many additional instructor pilots would be necessary to enable production at the rate of 1,400 a year.

Doherty, the 19th Air Force commander, said, as those deliberations continue, his near-term focus was on stabilizing the IP force so that it sustains the current production rate of 1,200 and not wear out, which would result in more experienced pilots leaving the Air Force.¹¹⁰ For some context on what the growth levels in the IP force might need to be to train 1,400 pilots a year, the 80th Flying Training Wing at Sheppard had 210 instructor pilots in November 2017, said the wing’s commander, Col Andrea E. Themely.¹¹¹ To support the Air Force’s goal of producing 1,400 pilots a year, the 80th FTW estimates that it would need to add 19 more, she said.

AETC officials said the possibility certainly exists that the command may need to take on contracted instructor pilots to support higher production levels. Ideally, these would not be experienced Air Force pilots who separate just to come back as contractors. Already the 80th FTW is working to fill an immediate gap in US instructor pilots by bringing in about 10 contractors with fighter backgrounds to return more experience back to its multinational instructor force.¹¹² Wing officials hope to have those instructor in place before the end of Fiscal 2018, said Themely. The wing would spread them fairly evenly across its T-6, T-38 SUPT, and T-38 IFF instructor cadres, with the emphasis on introduction to fighter fundamentals, she said.

The Air Force trains instructor pilots at Randolph; the NATO program at Sheppard also trains new instructors. Budget cuts that have reduced flying hours at operational squadrons in recent years mean pilots the Air Force chooses from across the combat and mobility air forces for pilot instructor training (PIT) “might not have had the same training opportunities that aircrew in the past have had,” said Col Joel L. Carey, commander of the 12th Flying Training Wing at Randolph that teaches the PIT course.¹¹³ “They might have been going all over the world conducting operations like we have been the past 25, 26 years, but the opportunity to develop depth and qualifications ... is not as available for them,” he said. As a result, personnel officials find

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Over-absorption (i.e., accepting too many new pilots) decreases a unit's readiness, whereas under-absorption (i.e., too few new pilots) can lead to severe manning shortfalls. "It's a delicate balance," said Drichta, AETC's chief of undergraduate flying training.

themselves having to approve waivers more often to enable these pilots to attend PIT, said Carey. "Now, the end product, we still hold the line. The standard has not changed. But to get from A to Z on that student instructor pilot [requires] more sorties and more hours" at PIT, he said.

AETC officials are looking at how they produce instructor pilots and exploring options for revamping PIT, said Carey. Right now, it takes about four months to produce an instructor pilot, Carey said. "We are doing a good scrub on why is that. Is that still valid? Are there better ways to potentially get to that product?" he explained. Changes could trim that length down but might mean "accepting risk in how we define a graduated instructor pilot," he said. As that issue plays out, wing officials are "having an increasingly difficult time" maintaining the instructor pilots they already have due to issues like the commercial airline hiring boom. "We are trying to find that sweet spot of sustainable production so at the end of their tour here at Randolph, they are not worn out and ready to check out of service in our Air Force," he said. "Anybody who is wearing the uniform ... they know that there are going to be moments of additional effort, surge, extra sacrifice that is asked of them.

But we strive to do that in a very deliberate and precise way, if you will, where we know what we are going to get out of it" and how to mitigate the detrimental effects on the airmen, he said.

Along those lines, the Air Force in summer 2017 began to keep instructor pilots in its pilot-training line squadrons off of the service's normal rotations of forces around the globe. "It has been a big help," said Leonard. "Folks can actually come out of an operational assignment to [here] and rest and recuperate, spend time with family, particularly at the age that they are at," he explained. "The ability for them to come back here and know that they are not necessarily going to be deployed has been a huge morale boost and has retention benefits," said Leonard. That's especially important since the wing's F-16 instructor pilot force has been significantly undermanned, hovering between 60 percent and 65 percent, said Leonard.

Similarly, Themely, said the move was "a good call" since it is in line with the goal of increasing pilot production.¹¹⁴ "We cannot do that on the backs of [the instructors] and draw down our manning to 75 percent so that we can send these guys downrange," she said. Many of the IPs currently in the training units had just completed operational tours. "If they have a good environment here where they are happy and they are excited about the mission that they are doing and they don't have to worry and stress about a deployment around the corner in six months, then it helps to retain some of that talent that we currently have," she said.

The Limiting Factor of Absorption

Once new pilots leave the training pipeline, they embark on their first operational assignments. The Air Force's operational squadrons accept them into flying positions and they work under the mentorship of the units' experienced pilots to hone their skills and gain proficiency so that they become mission-ready and can later qualify to take on more responsibility.

"Absorption" is the term the Air Forces uses for this assimilation process. "It is really about codifying and cementing a skill set that you have been trained in to the point that you can move away from that skill set and come back at a later date in time ... with minimum spin-up training," said Root, the Aircrew Crisis Task Force's retention lead, who also serves as the task force's point man for absorption issues.¹¹⁵ Ideally, the Air Force seeks a steady flow of new pilots into the operational squadrons and to season them in a timely manner with actual operational flying skills, all while retaining a healthy ratio of experienced pilots to inexperienced pilots in each unit, and maintaining readiness to execute combat missions.

Over-absorption (i.e., accepting too many new pilots) decreases a unit's readiness, whereas under-absorption (i.e., too few new pilots) can lead to severe manning shortfalls. "It's a delicate balance," said Drichta, AETC's chief of undergraduate flying training.¹¹⁶ "If you put too many people through training pipelines and they are all stuffed in the line squadrons at the same time, you get a heavily inexperienced force out there without a lot of experienced aviators who

are able to accomplish the upgrades for those individuals and mentor them and continue to teach them what we need to teach them and give them that experience,” he said. Simultaneously, units don’t want to decrease pipelines to the point where few inexperienced aviators are flying, as this hurts efforts to effectively mentor of new pilots.

Today, the Air Force’s operational squadrons are generally able to absorb these first-assignment pilots, save one group: the fighter force. “There is not an absorption problem anywhere but in the fighter community,” said Root, though that may change as pilot production increases. The situation will only become more challenging when a greater number of new fighter pilots start to enter the ranks as part of the Air Force’s overall production ramp-up. “We are going to go right up against what we think are the limits for experienced ratio

in the squadrons and move some experienced guys on and bring in inexperienced guys,” said Holmes, the ACC commander, in November 2017.¹¹⁷

Normally, it takes about two years to absorb a fighter pilot, whom Air Force officials routinely refer to an “11F,” the designation among the service’s specialty codes that identify an airman’s career track. The fighter force’s absorption challenge lies in its diminutive size—56 fighter squadrons spread across the Active Duty, Air National Guard and Air Force Reserve

Command wings—compared to the time of the first Gulf War against Iraq in 1990-91 when the Air Force possessed more than twice that amount. “There are fewer jets and fewer wings and the cumulative effect is fewer jets to fly,” said Root. With many squadrons flying 30 to 40-year-old aircraft now, these units cannot generate enough sorties for inexperienced pilots to earn their qualifications and complete upgrade training, while the units concurrently meet their other commitments.

When the Air Force had 110 fighter squadrons, a given squadron could produce between 4-6 experienced pilots a year, Holmes noted. “You’d take in about that many lieutenants straight out of pilot training and [several] years later, you’d kick

them out the door as experienced fighter pilots. When you are down to 55 fighter squadrons—32 in the Active Duty—then that really restricts your ability to produce experienced 11Fs.” Holmes added his goal is to produce “experienced 11Fs” not just guys who can fly fighters.

Highlighting that dearth of experience and its effect on absorption, Air Force Secretary Wilson in November 2017 related a conversation she had with the father of an F-22 pilot who serves in a leadership role in an F-22 Raptor unit at JB Elmendorf-Richardson, AK.¹¹⁸ The dad said to his son, “Gosh, you’re a pretty senior guy to be flying. Why are you flying with your squadron?” recounted Wilson. The pilot answered, “Dad, we only have three instructor pilots in the whole squadron. We’ve got all these youngsters, and they have to be trained to be able to do the mission. So, we’re just really short of people who can teach in the squadron,” she said.

The present situation is the result of USAF decisions made years ago. Over the past decade, the Air Force under produced fighter pilots and drew down the fighter force by hundreds of airframes due to factors such as long-overdue and pressing force recapitalization, pressures to divert airmen and funds to build up cyber, RPA, and space forces to meet burgeoning mission demands, and relentless budget instability. Up until 2016, the Air Force was producing fewer than 220 fighter pilots a year, the number it could absorb—not the number needed to meet the requirement for fighter pilots, said Root.

To increase fighter-pilot absorption, the Air Force is taking numerous steps. Among them is shortening a new fighter pilot’s first operational assignment from two years and eight months to two years and four months. This change will take effect in spring 2018, and will be manned by commanders, not the Air Force Personnel Center. It goes back to the fact that absorption usually takes about two years on average. Another initiative is to have Air Guard and Reserve F-16s units absorb more pilots, in this case, Active Duty ones. The Air Guard and Reserve squadrons “are going to take some of our lieutenants straight in out of pilot training,” said Holmes. “They have a need for more full-time people because they have the same problems with the airlines and the full-

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time competition that we do, so they have a need for some full-time folks.”

The F-16 operational force—11 Active Duty squadrons and 13 squadrons across the two reserve components—has the largest absorption requirement. While Air Guard and Reserve units own about half of the Air Force’s F-16s, they absorb only about 15 percent of new F-16 pilots each year, said Root. Conversely, the Active Duty force must absorb 85 percent of new F-16 pilots with the remaining half of the F-16 inventory (by May 2018, those numbers had gone to an absorption rate of just under 25 percent for the Air Reserve Component, with the Active Duty taking on 75 percent of new F-16 pilots, per Air Staff

figures). At the start of Fiscal 2018, the Air Force started assigning Active Duty pilots to seven Air Guard squadrons, said Root. Each squadron will get five; they will not all arrive in the same year or finish the assignment at the same time, he said. To support the extra pilots, the Air Force also began funding second-shift maintenance at these Air Guard locations. This will enable the F-16s there to fly twice a day, instead of once. The net result will be that the Air Guard squadrons will together absorb about 10 additional Active Duty pilots each year, Root said.

The Air Force is also partnering with the Marine Corps and Navy to build pilot experience;

these sister services will absorb a small number of Air Force pilots each year. Starting in June 2018, two limited-experience F-16 pilots with less than 300 flight hours will learn to fly the marines’ F-35B stealth fighter variant and then will serve a three-year assignment with a Marine Corps combat squadron, said Root. The Air Force will send two young pilots each year, for a maximum of six on this exchange at any one time, he said. The Air Force will also send five young pilots out of Introduction to Fighter Fundamentals instruction to Naval Air Station Whidbey Island, WA, where they will train to fly the E/A-18G Growler electronic warfare aircraft (the exchange

came about based on an agreement the Navy and USAF signed in 2014). The pilots will then spend three years with an operational Growler squadron following their training.

With those various initiatives, the Air Force thinks it will now be able to absorb 280 fighter pilots a year, said Root. That’s the same number of new fighter pilots the Air Force is ramping up to produce around Fiscal 2019, he said. “That gets us to a point where we stop hemorrhaging pilots. We stop losing more than we produce,” he said.

Increasing the utilization (or “UTE” rate) of fighters (i.e., how many time they fly a month) would also boost absorption somewhat. Today, the average UTE rate for the fighter force is approximately 12, about three less than a decade ago. To support increased sortie rates, the Air Force is on course to eliminate by the end of Fiscal 2019 the shortfall of some 4,000 maintenance personnel that arose several years ago with the growth of the F-35A force and Congress’ refusal to allow the Air Force to retire the A-10 fleet to free up maintainers for the F-35s. Although the maintenance force will be at full strength in Fiscal 2019, it will still take about five additional years for the new maintainers to reach the proper skill levels (i.e., apprentice, journeyman, and craftsman) that the Air Force needs, said Root. The Air Force is also funding weapon sustainment again at higher levels as part of its readiness recovery; however, it normally requires years for improvements in areas like parts supply to result in more sorties.

Another potential means of increasing the annual fighter-pilot absorption beyond 285 lies in the light attack aircraft (O/A-X) the Air Force intends to acquire starting in the next several years. O/A-X would operate in uncontested airspace and serve in observation and strike roles in support of friendly ground forces fighting terrorists or insurgents. It would spare the Air Force from having to employ its most sophisticated strike platforms like the F-22 and F-35A in hostilities where they are not necessary; instead, it could reserve them for higher spectrum conflicts.

This airplane’s core justification, however, is the cost-effective role it could play in combat operations and partnership building—and not its use as an absorption tool. However, an O/A-X fleet would go a long way to solving absorption

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issues. “If we had 300 light attack aircraft, we could absorb our way out of this problem much quicker, probably in seven to 10 years from the day the first one comes off the line,” Root said. Such a fleet would allow new pilots to enter the operational force and hone their flying skills in this type of aircraft before moving on to more-advanced platforms. It would “season pilots right out of pilot training,” said Themely, the 80th FTW commander.¹¹⁹

The Air Force is also updating how it defines pilot experience in its policy documents, which will affect absorption, said Root. Typically, a new fighter pilot has had to amass 500 flight hours—which included a small portion of hours

in the cockpit back at the formal training unit—and the squadron commander’s signature among the criteria for the Air Force to consider him/her absorbed. The standard was different for some aviators, such as first-assignment instructor pilots, who complete undergraduate pilot training and then circle right back into the training pipeline to instruct in platforms like the T-1, T-6, or T-38. They received at least partial credit for the hours they spent flying as instructors when they moved on to their first assignment with an operational squadron.

The experiences of the conflicts in the Middle East since 2001 have shown that hours flown is not always the best standard to gauge a pilot’s experience and proficiency. “What we have seen is a lot of our guys are deploying in their first assignment, sometimes twice, and when they go downrange, they are just doing close air support and sometimes for six, seven, eight hours at a pop,” said Root. “We have had young wingmen hitting 500 hours in their first year, year and a half, because of these dynamics. Those guys were called ‘absorbed,’ when, in reality, they were not proficient in their primary mission set yet,” he said. An example of this would be a new pilot in an F-16 Block 50 squadron that has a primary go-to-war mission to suppress the air defenses of the enemy in scenarios where the battlespace

is contested and congested. Flying circles in the sky performing close air support over Afghanistan or Syria is not the same job. As a result of those lessons, the Air Force is going to make sorties flown—about 250—instead of hours, one of the main criteria for absorption, along with the squadron commander’s signature and the young pilot’s upgrade training to lead either a two-ship or four-ship flight, depending on the platform, said Root. Though it may not build experience faster, Root noted, the new understanding of absorption will gauge proficiency better.

The Air Force, as part of a broader look at where it could introduce training efficiencies across the entire pilot-production pipeline, is also examining what activities it might shift from the operational units to the formal training units to help with absorption.¹²⁰ “There are some opportunities for efficiencies here and there,” Leonard, the 56th Fighter Wing commander, said. For example, whereas a new A-10 pilot normally requires only a local-area orientation with his/her new operational squadron to be mission-qualified after graduating the FTU, young pilots of more-sophisticated multirole fighters, like the F-16, depart the FTU “with maybe not as much depth of skill that they need to go into combat” and, therefore, need several months of qualification training at their first operational assignment to become mission-ready, he said. While there have been valid reasons for doing this over the years—like making sure pilots of more-sophisticated jets had the basic skills down—there might be room for more homogeneity in approach, he indicated.

At the same time, the Air Force is also looking at the merits of speeding up the process of getting pilots through the FTUs to the operational units, said Leonard. “There is an acculturation with the people whom you will fight with in combat that is really important,” he said. That said, the Air Force would only advance pilots from the FTUs to the operational squadrons more quickly under the proper conditions, said Kwast.¹²¹ “We are not going to compromise on quality,” he said. “We are not going to compromise on the safety and ability for an aviator to move into a fighter squadron and have the skills to be part of the team to the level that [ACC Commander] General Holmes is comfortable with,” he said.

The T-X: Long-Term Pilot Production Modernization and Resiliency

As the Air Force deals with the pilot shortage, it is also taking a bold step that will shape its future pilot-training enterprise and the combat capability of the service as a whole. That move is selecting the supplier of its Advanced Pilot Training Family of Systems (APT FoS), or T-X, as service officials call it. T-X is a complete training system, not just a new trainer aircraft, and is being pitched as a training-enterprise refresh in order to better prepare pilots for 21st century combat—a far more ambitious goal than buying a replacement trainer for a 1960s-era jet.¹²²

As of January 2018, the Air Force plans to acquire up to 350 T-X aircraft by 2034 over the course of 11 production lots. The T-X is expected to make its initial operational debut by 2024, according to Air Force projections. When AETC has in hand the T-X initial operational capability (IOC), the new training system, including the new trainer aircraft, will support introduction to fighter fundamentals instruction, supplanting the T-38s used in that role. At a later point, when the inventory has grown, T-X will become a part of specialized undergraduate pilot training for student fighter and bomber pilots, allowing the phaseout of T-38s from that role, too. AETC will also use T-X to train its instructor pilots; additionally, T-X will support the pilot-training that the Air Force runs with NATO allies at Sheppard AFB, TX.

In addition to recapitalizing the pilot training enterprise, the T-X family of systems is a broad response to the changing face of the US Air Force in the coming decades, as fourth generation force structure goes away and is steadily replaced by a fifth-generation force. The fielding timeline of the T-X system is critical to this process because USAF leaders project that by 2031, three years before the T-X system is slated to be at full operational capability, more than 60 percent of the Air Force's combat fleet will be composed of fifth generation

aircraft, like the F-35A, the F-22, the B-2, and the B-21.¹²³ The F-35A, in particular, though available today in limited numbers will eventually reach an inventory of more than 1,700 aircraft. The B-21, the service's newest bomber, will be available for combat by the mid 2020s, based on USAF's current schedule.

Student pilots of these aircraft will need undergraduate (and graduate-level) instruction in high-G environments, immersive information and sensor management, high angle-of-attack flight characteristics, night operations, transferrable air-to-air and air-to-ground skills, datalinks simulated radar and smart weapons and defensive management systems. The T-X aircraft and family of systems accompanying it will be the means to provide this modern instruction and exposure, as it is completely unfeasible for the Air Force to build a training program with the 1960s vintage T-38 Talon aircraft to accomplish all of these tasks. This will mean smarter training—a more straight forward, logic-driven process whereby the training enterprise is built to the needs of current mission needs. This is far different than mission needs adapting to the limitations of a forty-year-old trainer. There is no getting around that even with life extension efforts, the T-38 falls far short of the capability the Air Force needs to build a force of modern, fifth generation pilots.

For example, information management is a far larger part of a pilot's responsibilities today than when the T-38 first rolled onto flightlines in the 1960s. This results in training shortfalls in critical parts of the training pipeline. The cockpit and sensor-management limitations of the T-38 mean student pilots cannot complete two-thirds of their advanced undergraduate pilot training tasks today—much less in the coming years when fifth generation aircraft will become increasingly common. This limitation requires student pilots to learn these skills later on in the pipeline, at the bomber and fighter formal training units, which comes at a much greater cost to the Air Force.¹²⁴ As the Air Force trains more towards a “fifth generation force, there is more of a gap between the platform we have to train with and what [student pilots] are eventually going into,” said Carey, the 12th FTW commander (the 12th FTW uses T-38s currently to train new instructor pilots

As the Air Force deals with the pilot shortage, it is also taking a bold step that will shape its future pilot-training enterprise and the combat capability of the service as a whole. That move is selecting the supplier of its Advanced Pilot Training Family of Systems (APT FoS), or T-X, as service officials call it.

and students at the IFF course). This will also afford benefits in the absorption phase of training because students will have had better up-front preparation that aligns with operational demands. This is a significant factor, given that the cost of flying a T-X or using an associated simulator is a lot cheaper than flying a fifth-generation operational platform for basic skill acquisition.

But new airframes are only part of the proposed enterprise-wide solution. In addition to buying up to 350 modern trainer airplanes, the T-X program also calls for concurrently fielding a robust ground-based element featuring state-of-the-art simulators, support equipment, academics, interactive multimedia instruction, and more. With this capability, AETC expects to take a great leap from a training pipeline entrenched in the bygone industrial age to a construct that is information-age-centric and places more emphasis on individualized training. There is so much that can be better executed on the ground in a high-fidelity simulator. Students can focus on key aspects of learning in a more progressive, focused fashion. It is also much cheaper than burning thousands of dollars' worth of jet fuel each hour. When they are ready for real-world application, students can then take their simulator acquired

skills and try them in the sky. There is a reason why commercial airlines operate this way too—it just makes sense. It is also why acquisition officials and Congress must understand that the T-X program is not just about a jet—it is about an enterprise. Funding must match this thinking for it to work. Short-changing the ground-based elements of the system will cost more in the long run due to induced inefficiencies, and endanger pilot production.

When fully fielded, T-X will allow the Air Force to produce better pilots and do so in less time. For instance, it might enable undergraduate pilot training to shrink in duration by several months. With T-X, AETC officials think they will be able to instill students training to fly modern

bombers and fighters (e.g., F-35A, future B-21 Raider stealth bomber) with the foundational flying skills and core competencies required to operate them. This is something the T-38 cannot deliver due to the limitations of its design. By incorporating simulators with greater fidelity and realism than AETC employs today, along with leveraging advances in other areas of technology like augmented reality and virtual reality, T-X holds the promise of allowing some flight training activities to migrate from the cockpit into the simulator.

Doing more training in high-fidelity simulators would be a significant cost savings and would free up the T-X trainer aircraft for other more value-added training. Those activities could include taking on some tasks that student pilots perform today at the formal training units. That would lessen the burden on the FTUs, which, in turn, might be able to take on flying duties to relieve the qualification training and upgrade training demands on the operational units. The net effect there would be helping the operational fighter units to absorb new pilots more easily, which, as discussed earlier, is currently a pressing need.

Still, many experienced pilots caution that developing airmanship at the high standards the US Air Force demands requires a more reasonable understanding of actual flight experience—and the Air Force should be careful not to become too reliant on simulation. Procedural habit patterns, incremental task complexity, and reduced costs are all possible for an increased share of the training experience. Airmanship on the other hand is refined in an environment of dealing with task and true risk rather than simulated risk of life and limb, the impact of exceeding operating limitations, and the sensory overload of actual flight conditions. Where the balance is found in the new T-X enterprise depends on both technology and methods.

In interviews with officials across the pilot-training community in October 2017, there was a desire to see the complete T-X buy accelerated, if possible. “IOC probably will not change. But we hope that ‘FOC 10 years later’ will be ‘FOC five years later,’” said one senior training official. Compressing the time between T-X initial operations and the point when the fleet reaches full strength would shorten the period of transition from the T-38 to the

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AETC envisions a future with T-X that could go beyond the current plan. Under an approach the command calls generalized undergraduate pilot training (GUPT), T-X aircraft could potentially replace T-1s, too, leaving T-6s and T-X airplanes for use in all primary and advanced flight training, respectively.

T-X, thereby allowing the training pipeline to enjoy the full capability sooner. It would also cut down on the period during which AETC would have to keep spending on T-38 sustainment and operate separate cadres of maintainers for the T-38 and T-X. Such acceleration would require increasing the number of T-X aircraft bought in each production lot to reach 350 more quickly. Right now, 40 is the maximum number of T-X airplanes scheduled at the program's full rate of production. AETC Commander Kwast said he first wants to see what the command discovers in 2018 from activities like the Pilot Training Next course before determining whether he would champion accelerating the full T-X buy "and the cost that goes with that."¹²⁵

For the first few years after the T-X aircraft enters the inventory, AETC likely would need some additional maintainers to keep the T-38s flying and to care for the new T-Xs. Once the T-X fleet is at full strength and the T-38s are gone, the level of maintainers will stabilize, said Montoya. Over the long term, he said he did not expect to see much difference in the number of maintainers AETC will require for T-X compared to the T-38 today. "When you look at our workforce, it is really focused on launching aircraft and phased inspection, which will be required of the T-X also, so I do not think we are going to see a big change there," he said. The Air Force made sustainment considerations "a big part" of the T-X solicitation and that should pay off big-time over the years of flying the trainers, said Montoya.

The Air Force also applied lessons of past acquisitions that will benefit T-X sustainment, said Webb, Laughlin's maintenance director.¹²⁶ "The main thing that bubbled up was the need to have a formalized maintenance training plan. We need to purchase that. So, that is part of the funding for the T-X," said Webb. This is resulting in a maintenance training center that AETC will stand up at Randolph in the next several years, even before T-X is fielded. Not only will it benefit T-X

maintainers, but also those who work on AETC's current trainer fleets. "We will be able to take T-1, T-6, and T-38 maintainers, send them to Randolph for a T-1 engine school or a T-6 rigging class or a T-38 aileron class. ... Every school imaginable, they will have there and we can send our people there to get them trained," said Webb.

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This concept could advance even further to a single-aircraft model by removing the T-6s and using exclusively T-X trainers for the entirety of undergraduate pilot training. Both GUPT variants would require the Air Force to procure additional T-X airframes beyond the current program. While the GUPT model would offer AETC more training flexibility, the command acknowledges it would be costlier, creating the question whether enterprise flexibility and non-monetary benefits outweigh cost concerns.

Insights and Recommendations

When examining the issues and trends surrounding the Air Force's current pilot production and retention challenges, Mitchell concludes that today's pilot crisis is not simply a cyclical phenomenon the service has seen before. While factors like an improved economy and a global surge in airline hiring have pulled at pilots by offering alternatives to continued service, the context has changed dramatically. This shortage has placed Air Force readiness at risk. Emerging from the pilot crisis requires new thinking in the handling of three interdependent factors: retention, pilot production, and absorption.

It also appears that inertia is taking hold with regard to long entrenched bureaucratic processes, values, and a culture of pilot force management that places long-term transformation at risk. From a historic perspective, the Air Force is taking an unprecedented approach in response to the crisis and removing normal staff process ownership that was not up to the task. The service created the Aircrew Crisis Task Force, and many

key areas are still under study as experienced pilots continue to leave. Although the term “crisis” fits the situation, the entire system does not appear to be on a crisis footing, most notably in the area of retention factors, which are weighted in how the pilot force is managed. As the Air Force continues to formulate a recovery plan, the Mitchell Institute believes the following insights should prove useful in helping address the pilot shortage crisis.

RETENTION

Few substantive changes to pilot force management resulted from previous pilot shortages. Many factors cited by recently separated pilots are identical to factors cited in previous eras of pilot loss. Care must be taken to not simply cater to the irritations in shotgun fashion—a

transformation of pilot force management will afford long term retention improvements. That conclusion however requires a bold commitment to overturning enduring Cold War processes, values, and culture in the force management bureaucracy.

Energize crisis action at all levels of the chain of command down to the 1st level supervisor.

It is clear that executive leadership of the Air Force understands and is striving to address the pilot shortage crisis. However, interviews of recently separated pilots suggest the crisis response is uneven. One of several themes that emerged from interviews revealed a lack of advocacy or

supervisors refusing requests to engage the Air Force Personnel Center on behalf of experienced, combat-decorated pilots who desired to stay, but needed adjustments for family concerns following multiple six-month deployments. The “take it or leave it” ultimatums and apathy of supervision was credited for several separation decisions. Although Mitchell’s efforts also identified exemplary cases of command involvement, we recommend the Air Force examine the directives made to all supervisors, regardless of career specialty or location, concerning the critical need for them to retain pilots.

A new, long term force management structure. Throughout the research for this paper, Mitchell identified numerous rough edges in rated force management. Examples include pilots being in deployed combat operations, but being forced to deliberate over assignment notices with a seven-day suspense to accept the assignment, or choose separation. A system that forces airmen to fly high-stress combat missions, then land to deal with life changing assignment decisions was characterized as an Air Force that does not respect its pilots. In Afghanistan, several years ago, now separated pilots of a deployed squadron were required to fly deployed combat missions and then personally complete their “retention packages” during a period when certain year groups were being evaluated for forced separation. In the short-lived MC-12 mission composed of two squadrons, estimates were given that as high as two thirds of pilots separated in part because of broken promises concerning returning to a previous assigned aircraft variant, a lack of advocacy for follow-on placement, and even a lack of a squadron commander with sufficient rank to advocate for them. We believe that the Air Force must recraft pilot force management.

Adapt pilot force management to accommodate shifting cultural norms. The Air Force faces profound challenges in modernizing its force management to better account for modern social, familial, and career norms. The Mitchell Institute is working on research in this area as well, slated for release later this year, and the preliminary findings highlight several areas for improvement in an Air Force personnel management system that has become increasingly incompatible with 21st century airmen. This research paper, under the working title *Female Officer Retention and the Millennial Imperative*, makes a key assertion that American society has changed significantly, and this fact must be accommodated in order to recruit and retain talent. American culture “no longer reflects the traditional nuclear family model and generational value sets regarding marriage, parenting, income, and career”—and attitudes and norms governing these subjects have changed dramatically in just the past few decades.¹²⁸ Though this particular project focuses on the low rates of retention for women compared to men, it further notes that the US’ overall talent

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marketplace is developing value sets that were once believed to be unique to women. The research also shows “that women may be leading indicators for future retention problems in the millennial generation and beyond,” the paper states. The problem, as time goes on, is affecting the entire workforce. Outdated force management practices for today’s talent pool that continue to force women to separate at high rates increasingly affect both genders. A long-term Air Force retention strategy must include a significant adaptation of pilot force management to reflect the priorities and practices of younger millennial airmen, and those who enter service after them.

Experimenting with contract pilot force management. As stated earlier in this paper, Mitchell believes there is enough evidence to conclude that institutional ownership of pilot force management has failed to adapt to changing societal norms and practices. Consequently, the Air Force might benefit from practices culled from the private sector and commercial airlines, which might be more in tune with the post-September 11, 2001 generation as they have steadily entered the workforce in recent years. The Mitchell Institute recommends the Air Force experiment with a competitive acquisition of pilot force management services with an underlying goal to improve factors that are often reported as driving separation decisions. Such experimental efforts should seek to harness commercial industry standards for human resource management that reflect a high regard for retaining talent. While the pilot force must be capable, ready to respond, and grounded in a warrior ethos, new approaches to pilot force management must be tested to improve long-term retention, as well as pilot professional development. It is worth noting, this was undertaken as part of the pilot production process in World War II.

Holistic Retention Strategy. The Air Force is responding with initiatives to address specific factors affecting a pilot’s decision to stay in uniform, or leave military service. However, research shows some initiatives were also attempted in previous pilot shortage periods, to varying effect. When

the crisis passed, many of the “quality of life” and “quality of service” improvements faded. Retention requires a unifying strategy that examines all possible factors while ensuring those changes are enduring.

Ensure retention factors are understood. The Mitchell Institute offers that the Air Force may not be evaluating a sufficient sample size of separated pilots, via direct contact, to have a complete understanding of the push factors affecting separation decisions. Former pilots we interviewed mentioned the barrage of surveys they encountered during their Active Duty service. Most did not respond to Air Force surveys—yet all had very strong, articulate, and constructive opinions about pilot retention issues. While the Air Force is making a concerted effort to seek feedback and carefully track its survey data, we recommend a relook at the sufficiency of the current methods to further understand retention factors. For example, Air Force leadership, working with Congress, must also resolve issues unique to the service’s reserve component that are impeding higher pilot retention. One case in point is securing Tricare Reserve Select medical coverage for Air Reserve Technicians (ARTs), who are full-time members of the Air Force Reserve and Air National Guard. Supporting this initiative “would do more for the retention of our critical technician force than any action over the past few years, and the time is now,” Maj Gen Derek P. Rydholm, Air Force Reserve deputy chief, told the House Armed Services Committee’s readiness panel in February 2018.¹²⁹

Budget stability impacts retention. In addition to supporting the training pipeline’s growth and resiliency, Congress must act more broadly and deliver stable defense budgets. In early February 2018, Congress passed the Bipartisan Budget Act of 2018, legislation that raised defense spending to \$700 billion in Fiscal 2018 and \$716 billion in Fiscal 2019, respectively. This action removes the specter of an unending string of continuing budget resolutions for the next two fiscal years, but it does not completely remove the possibility of another budget sequester after that. Accordingly, Congress still has work to do to end the specter of a Budget Control Act-driven sequester for good. “If we go through sequester

again, a 2,000-pilot shortage will be a dream; people will walk,” said Air Force Secretary Wilson in November 2017. “This will break the force,” she warned.

Too small an Air Force drives low retention.

The Air Force has been deploying and fighting for over 25 years while downsizing its force structure. Today, the Air Force does not have enough force structure to sustainably support its current operational tempo. While the service meets its taskings, it has necessitated longer and more frequent deployments and greater use of the reserve component. This high operational tempo is a causal factor in pilot exit rates, and the worst may be yet to come. As more pilots separate, tempo will increase for those pilots who remain.¹³⁰ The Air

Force must articulate that a critical driver of low pilot retention is an emerging long-term mismatch of Air Force tasking and its force structure.

PRODUCTION

Because of the severity of the pilot shortage, and the lack of a clear intercept path to increase production and fill the gap, there is a fresh willingness to entertain all ideas to expand and improve pilot production. Urgency of effort and sufficient resourcing needs to remain elevated. The Air Force must clearly

communicate that the Air Force’s pilot production enterprise is a strategic asset that must regain its strength and resilience, with emphasis on much needed modernization and innovation.

Increase both capacity and surge capability for the long term. Past decisions by Congress have created a bare minimum pilot production infrastructure to include basing, airspace, and aircraft. These actions failed to account for uncertainty in future pilot production requirements. Mitchell’s research leads us to conclude that the Air Force needs to re-establish a significant capacity to respond in months, not years, to unforeseen requirements to surge pilot production.

More action, more innovation, more experimentation. The Air Force must continue to keep past lessons in focus as they optimize present

operations and leveraging cutting-edge technology to achieve the most-efficient and effective pilot-training enterprise. While there is tremendous resistance to change in undergraduate pilot training—rooted deeply in pilot culture—crisis must lead to action. To that end, we recommend more resources are needed to experiment, innovate, and aggressively explore what Air Education and Training Command leadership has characterized as an “all ideas are on the table” atmosphere. To that end, a better structured avenue is needed for reviewing unsolicited industry proposals.

Contractor options. As the Air Force must fill a pilot shortage while keeping front-line squadrons fully manned, a surge in pilot production requires more instructor pilots. Because of this need, service leadership, as well as lawmakers, should not shun innovative uses of contractors in the training pipeline. Several options range from contractor augmentation of US Air Force instructors to a contractor-managed undergraduate training base. The Air Force already is warming to greater use of contracted pilot services, such as its recent move to expand the scope of its contractor-provided adversary-air training fleet at Nellis AFB, NV.¹³¹ Precedents abound outside the Air Force. The US Navy employs contracted flight instructors, many of them veterans, throughout its undergraduate flight training. They provide most of the ground training and simulator instruction and “play a major role in the inculcations of a military ethos,” said Cmdr Ronald S. Flanders, Naval Air Forces spokesman.¹³² The US Army, at its aviation center of excellence at Fort Rucker, AL, utilizes uniformed personnel as the primary source for its undergraduate-level academic and flight instruction, but Army civilians and contractors augment them, said an Army spokesman.¹³³ A recurring theme in our research was a fear that increased use of contract instructors may degrade the quality of current graduates, especially in the process of enculturation and building warrior ethos. Research during this study, however, suggests otherwise.

Contract training and the airman warrior ethos. The Air Force’s experience with initial flight training shows that a contractor-run, “turnkey” pilot-training operation, with service oversight, is not only feasible but potentially beneficial. L3 Doss

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Aviation has been able to configure IFT in a way that not only provides quality instruction, but also helps to instill the military ethos. The operation immerses trainees in an Air Force training environment that rivals the UPT bases presently, and the company's cadre of instructor pilots is highly experienced, averaging 5,000 total pilot hours and 3,000 total hours as an instructor pilot.¹³⁴ More than three-quarters of these instructors are former military aviators and come from a mixture of backgrounds.¹³⁵ The training is set up to maximize instructor contact with the students, and the Air Force's 1st Flying Training Squadron

has a permanent presence at the IFT facility to oversee contract execution and perform administrative tasks related to the students. However, the success of IFT is not a function of well-written requirements in the original request for proposals for the effort, per our research. A good deal of credit is due to the leadership of the contract operation and the dedication of the contract instructors. While Mitchell recommends contract

options, the Air Force must fully develop any proposed statement of work, both for future contract initiatives and the design of government oversight on those contract operations.

Continue to leverage the value of IFT.

Interestingly, as the Air Force considers new approaches to training—which could mean more student pilots bypassing initial flight training—Air Force training officials at the wing level and recent SUPT graduates praised IFT for its value. “We are very happy with the graduates that are coming from IFT; they are well prepared,” said Pekarek, Laughlin's 47th Operations Group commander.¹³⁶ Often, “those [students] who find themselves in the commander's review process for flying did not receive the benefit of IFT,” he said. “Even though we obviously have students who are successful with a private pilot's license, when you talk with them, they talk about that first week [of SUPT]—both in phase-one academics and also when they hit the flight line—and of the adjustments because they have not been immersed in that and introduced

to that,” he said. One recent SUPT graduate said “IFT greatly prepped” this new pilot for going through the remainder of undergraduate pilot training.¹³⁷ The structure was “very military-like” and the training was challenging and stressful. This new pilot thought “a lot of people wouldn't make it through” undergraduate pilot training without the experience of IFT. With these lessons and observation in mind, the Air Force should carefully reassess any measures that do not replicate the value of IFT.

The “can't fail” effort—the Advanced Pilot Training Family of Systems (T-X). It is crucial the Air Force fields the APT FoS T-X system on schedule and that this program delivers on time through its planned acquisition window. AETC officials were clear that any delays would have serious ramifications. This would force the Air Force to continue using the half-century-old, and operationally deficient T-38 to train pilots of its most-modern, most-sophisticated strike platforms. Equally disconcerting, the service would have to pump large amounts of funding just to keep these outdated jets flying. “People forget that, if there is a delay to T-X, I have got to go spend dollars that I don't have on keeping an old platform going,” said Montoya, AETC's logistics director. If T-X airframes flow into the force in planned succession, there will be no need to perform another life extension effort on the T-38s and can get those retired, he added. “That will be a huge dividend for us,” Montoya said.

The Air Force should do all it can to minimize the risk in fielding the T-X system. Lawmakers also need to understand the T-X program must remain properly resourced and intact (treated as a system of systems, not just a new trainer airplane) as it matures for the Air Force to exploit its full benefits. This point carries greater weight since the Air Force finds itself at a time when producing pilots—and possessing the organic capacity and flexibility to hike output, when needed—is taking on greater importance.

Take warrant officers off the agenda. Some lawmakers have pressed the Air Force to consider bringing back warrant officer grades, which the Air Force phased out in 1958, as one means of mitigating the service's pilot shortage.¹³⁸ Chief Master Sergeant of the Air Force Kaleth O. Wright

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has said he would be open to establishing a cadre of warrant officers, if the study validated that this would help make the Air Force more lethal and efficient.¹³⁹ However, there is no indication that warrant officers would be retained at higher numbers than commissioned officers. Mitchell concludes the initiative has no bearing on the limiting factors of production capacity, absorption, and more importantly, retention. Higher pay disparities between warrant officer pay and airline pilot pay would likely drive a lower rate of retention once service commitments are complete. This proposal also does not speak to the need to generate qualified officers to serve on staffs with operational flying backgrounds. In addition, the expense associated with training a warrant officer and a regular officer are by all estimates very similar. The Air Force should continue to position itself to reap

the full life cycle benefit of a fully-fledged officer both in the cockpit and beyond in staff billets.

ABSORPTION

As also noted in this paper, experienced pilots are needed to season inexperienced pilots that will eventually be pushed in greater numbers to operational flying squadrons. The limited ability of operational squadrons to absorb and mature new pilots is a limiting factor to recover from the pilot shortage. Efforts to improve absorption will produce marginal results within the constraints of a shrunken force structure, continuous operational tasking, and low retention of experienced pilots. Mitchell concludes that large movements are needed.

Retention mitigates absorption constraints. Improved retention of experienced pilots is needed to maintain healthy experience ratios in operational units. The Air Force must carefully monitor the possibility that efforts to maximize absorption do not place counterproductive demands on already heavily tasked pool of experience pilots.

Add light attack capability to improve absorption. The Air Force should commit to a light attack aircraft program to increase absorption as it gains a lower cost niche capability, and should see the O/A-X effort through to fruition. According to

another Mitchell analysis of recent light combat/light attack aircraft proposals, “10 operational [Light Combat Aircraft] squadrons could generate the same pilot growth in less than half the time, and at a much lower cost. Those experienced pilots could then move on to fly a fourth or fifth generation fighter in a follow-on assignment.” This mission set would go a long way to increasing pilot absorption, as well as fulfilling a critical mission need in current and future operations.¹⁴⁰

Evaluate a significant change to upgrade training. The Air Force should assess, with an eye to potentially significantly changing, how various training requirements and qualifications are conducted for fighter units. Traditionally, on course to maturing inexperienced pilots, instructors must fly upgrade missions according to a defined syllabus. In order to increase absorption capacity however, a portion of this training could be handled by a single upgrade “center of excellence” or similar entity. The Mitchell Institute recommends an expanded mission for the Formal Training Unit as a means of achieving this outcome.

Create an active reserve of pilots. As part of the Air Force’s ongoing review of its programs, budget accounts, and associated manpower authorizations in support of assembling its Fiscal 2020 multiyear budget plan, Congress and Air Force leadership should consider rebuilding a “strategic reserve” of rated pilots, such as the service has previously maintained in the past.¹⁴¹ This would be in addition to filling existing vacancies in rated staff positions. Currently, there is little ability to backfill a loss of pilots in a buildup to or during conflict. There is little staff reserve to account for a significant attrition of pilots resulting from sickness, a terrorist attack, or successful enemy attack. In 1999, for example, eight percent of the Air Force’s 13,146 pilots were in a status known as the “rated supplement.”¹⁴² These pilots served in non-rated positions and were available on short notice to operational units. With the 2018 National Defense Strategy placing priority on thwarting potential Chinese and Russian threats and strategic competition, this idea takes on renewed importance, as does committing resources to the pilot-training pipeline so that it retains the ability to boost output and subsequent absorption readily in times of need.

The Air Force should assess, with an eye to potentially significantly changing, how various training requirements and qualifications are conducted for fighter units.

Conclusion

The Air Force is struggling to organize and respond to a new pilot crisis that has precedence in terms of shortage, but not in terms of impact on the readiness of the service to execute its mission in a time of war with acceptable levels of risk.

For the first time since its founding as an independent service, the Air Force has acted to integrate efforts that were formerly stovepiped and largely ineffectual at stemming an enduring pilot shortage. Acknowledging this fact means accepting that the former, splintered nesting of responsibility for pilot force management must evolve, and quickly. The Aircrew Crisis Task Force is a step in the right direction, but bold action and speed is needed. Holistic analysis, integration of effort, resource prioritization, and cross functional authority is necessary to emerge from the crisis and further execute a flight plan for pilot force management that responds to the needs of this century, not the last.

This flight plan should include a cutting-edge modernization of pilot training that is strongly biased for acceleration rather than delay, to include the Advanced Pilot Training Family of Systems T-X effort. Along the same course, force-sizing constructs must consider factors related to pilot force management. The sophistication of modern airpower, and its technology, substantial resources, and time needed to build experienced

pilots is much more difficult to surge in crisis than in ages past. Resiliency and depth of the pilot talent resource pool must be refactored into new force-sizing constructs.

In Mitchell's examination of the three components of pilot force management—retention, training production, and absorption—we conclude that retention dynamics are the least understood, and anecdotes from a limited sampling of recently separated pilots may warrant an examination of methods by which data is collected and reported. Retention will be a long pole for decades to come. Improvement has immediate positive effect beyond growing out of the existing deficit of pilots.

In closing, as long as the mission to “fly and fight” remains central to the purpose of the US Air Force, it must do so by adapting to new realities of modern American culture, family, expectations, and surging economic opportunities that pull experienced pilots out of a highly skilled and trained all-volunteer US military.

The old justification that “the needs of the Air Force” eclipse how the service regards its pilots is a holdover relic of untransformed force management from generations past. Moving forward, pilot force management policy must bend its bureaucratic culture and processes to a place of innovation where the needs of the Air Force are inextricably linked to the needs of its airmen—its most precious resource. ✪

Endnotes

- 1 Capt Kenneth L. Scholz, USAF (spokesman, Air Force Headquarters Public Affairs), email correspondence with author, Nov. 28, 2017. Author's note: In Fiscal 2017, the Air Force had a requirement for 23,000 pilots overall, including 5,300 fighter pilots. It had 21,000 pilots, including 4,000 fighter pilots, in the force. Scholz provided the numbers; percentage calculations are the author's. Air Staff officials argue, however, that of the 1,300 empty pilot slots, at least 225 of these positions are currently undergraduate instructor slots being filled by other flying communities, over 300 are in the Reserve Component, with the remaining shortage in staff positions. Fighter pilot shortage is also most acute in the Active Duty Air Force, Air Staff officials note, with fighter pilot billets (11Fs) currently manned at 64 percent.
- 2 Heather A. Wilson and Gen David L. Goldfein, State of the Air Force Briefing, The Pentagon, Washington, DC, Nov. 9, 2017.
- 3 Wilson and Goldfein, State of the Air Force Briefing.
- 4 Secretary of the Air Force Public Affairs, "Air Force leaders address aircrew crisis," Sept. 22, 2017, <http://www.af.mil/News/Article-Display/Article-Display/Article/1321906/air-force-leaders-address-aircrew-crisis/> (all links accessed in May, 2018)
- 5 Future & Active Pilot Advisors (FAPA), "Major Airline Pilot Hiring 2017 by Month," <https://www.fapa.aero/hiringhistorymonth.asp> (accessed January 2018); and FAPA, "Major Airline Pilot Hiring by Year (2000-Present)," <https://www.fapa.aero/hiringhistory.asp>.
- 6 Col David S. Drichta, USAF (chief of undergraduate flying training, Air Education and Training Command), author interview, Nov. 14, 2017.
- 7 Lt Gen Gina M. Grosso, statement to the House Armed Services Committee personnel subcommittee on the military pilot shortage, March 29, 2017, 2, <http://docs.house.gov/meetings/AS/AS02/20170329/105795/HHRG-115-AS02-Wstate-GrossoG-20170329.pdf>.
- 8 Tom Philpott, "Airline hiring, lifestyle issues deepen Air Force pilot shortage," *Stars and Stripes*, Nov. 16, 2017, <https://www.stripes.com/airline-hiring-lifestyle-issues-deepen-air-force-pilot-shortage-1.498140>.
- 9 Senate Armed Services Committee (SASC), Posture of the Department of the Air Force hearing, June 6, 2017, <https://www.armed-services.senate.gov/hearings/17-06-06-posture-of-the-department-of-the-air-force>.
- 10 Brig Gen Michael G. Koscheski, USAF (director, Aircrew Crisis Task Force), media roundtable, the Pentagon, Washington, DC, Oct. 23, 2017.
- 11 Koscheski, author interview, Oct. 24, 2017.
- 12 Scholz, email correspondence with author, Nov. 27, 2017.
- 13 Maj Gen Patrick J. Doherty, USAF (commander, 19th Air Force), author interview, Oct. 16, 2017.
- 14 Scholz, email correspondence with author, Dec. 14, 2017.
- 15 Richard I. Wolf, USAF (director, Air Force Historical Studies Division), author interview, Nov. 15, 2017.
- 16 Carl Conetta and Charles Knight, "The Readiness Crisis of the US Air Force: A Review and Diagnosis," Project on Defense Alternatives Briefing Report, no. 10 (1999), www.comw.org/pda/afread01.html.
- 17 Lt Col John D. Rhodes, "Pilot Retention: A Historical Analysis," research report, Air War College, 1986, 4, <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA177897>.
- 18 Rhodes, 6.
- 19 Ibid.
- 20 Ibid.
- 21 Conetta and Knight, "The Readiness Crisis of the US Air Force."
- 22 Ibid.
- 23 Author's note: For example, see: SSgt A.J. Bosker, "Air Force implements Stop-Loss," Air Force Print News, March 14, 2003, <http://www.af.mil/News/Article-Display/Article/139842/air-force-implements-stop-loss/>; "Air Force eases Stop-Loss restrictions," Air Force Print News, May 14, 2003, www.af.mil/News/Article-Display/Article/139224/air-force-eases-stop-loss-restrictions/; and MSgt Eddie C. Riley, "Air Force ends Stop-Loss," Air Force Print News, June 23, 2003, www.af.mil/News/Article-Display/Article/138988/air-force-ends-stop-loss/.
- 24 Koscheski, author interview, Oct. 24, 2017.
- 25 Scholz, email correspondence with author, Nov. 28, 2017.
- 26 Barrie Barber, "Air Force facing growing crisis in pilot shortage," Dayton Daily News, Nov. 24, 2017, <http://www.daytondailynews.com/news/local-military/air-force-facing-growing-crisis-pilot-shortage/7HeHaEvvUzXKg8JUdBDP/>.
- 27 Scholz, email correspondence with author, Nov. 28, 2017.
- 28 Scholz, email correspondences with author, Nov. 16, and Nov. 28, 2017.
- 29 Grosso, statement to the House Armed Services Committee personnel subcommittee on the military pilot shortage, March 29, 2017.
- 30 Gen. James M. "Mike" Holmes, USAF (commander, Air Combat Command), "Readiness on the Line: Preparing Today's Force for Future Fights," Mitchell Hour talk at the Air Force Association office, Arlington, VA, Nov. 20, 2017.
- 31 A1C Nathan Byrnes, "Air Force faces fighter pilot shortage," 99th Air Base Wing Public Affairs, Jan. 20, 2017, <http://www.amc.af.mil/News/Article-Display/Article/1055113/air-force-faces-fighter-pilot-shortage/>.
- 32 Leslie Brown, USAF (chief, Air Force Recruiting Service Public Affairs), written response to author query, Nov. 30, 2017.
- 33 Ibid.
- 34 Brown, telephone conversation with author, Dec. 8, 2017.
- 35 Author's note: This comment is attributed to one of several separated pilots interviewed by the author in November, 2017.
- 36 Future & Active Pilot Advisors (FAPA), "Major Airline Pilot Hiring by Year (2000-Present)," <https://www.fapa.aero/hiringhistory.asp>.
- 37 FAPA, "Major Airline Pilot Hiring 2017 by Month," <https://www.fapa.aero/hiringhistorymonth.asp>.
- 38 SASC, Posture of the Department of the Air Force hearing, June 6, 2017.
- 39 Boeing, "Current Market Outlook 2017-2036," <http://www.boeing.com/commercial/market/current-market-outlook-2017/#/downloads>, and Boeing, "Current Market Outlook: 2017-2036," 20, <http://www.boeing.com/resources/boeingdotcom/commercial/market/current-market-outlook-2017/assets/downloads/cmo-2017-12-13.pdf>.

- 40 Boeing, "Boeing Global Services Forecasts 1.2 Million Pilots and Technicians Needed by 2036—20-year demand for cabin crew exceeds 800,000," July 24, 2017, <http://boeing.mediaroom.com/2017-07-24-Boeing-Global-Services-Forecasts-1-2-Million-Pilots-and-Technicians-Needed-by-2036>.
- 41 Helane Becker, *Pilots Retirements Accelerate Beginning in 2021 & Peak in 2025*, Cowen and Company, July 5, 2017, 1.
- 42 Ibid, 3.
- 43 Will Skowronski, "Pilot Shortage Back With a Vengeance," *Air Force Magazine* (2016), Vol. 99, No. 8, <http://www.airforcemag.com/MagazineArchive/Pages/2016/August%202016/Pilot-Shortage-Back-With-a-Vengeance.aspx>.
- 44 George Woodward, 2nd Lt Brittany Curry, and Debi Smith, "Pilot program remains laser-focused in the face of an Air Force pilot shortage," 82nd Training Wing Public Affairs, May 10, 2016, <http://www.aetc.af.mil/News/Article-Display/Article/756070/pilot-program-remains-laser-focused-in-the-face-of-an-air-force-pilot-shortage/>.
- 45 Grosso, statement to the House Armed Services Committee personnel subcommittee on the military pilot shortage.
- 46 Lt Col Langdon O. Root, USAF (retention line of effort lead, Aircrew Crisis Task Force), author interview, Nov. 16, 2017.
- 47 Civilian airline industry representatives, author conversations, January 2018.
- 48 Airline Pilot Central, "Pilot Salaries in 2018: Which Airline Will Have the Highest Pay?" Nov. 7, 2017, <https://www.airlinepilotcentral.com/articles/job-search-articles/top-airlines-to-fly-for-in-2018-based-on-pilot-salaries.html>.
- 49 Author's note: The average hourly salary in 2018 for a pilot with United Airlines is \$272.00 (lowest rate: \$232.00; highest rate: \$328.00); Delta Air Lines, \$257.00 (\$156.00 to \$330.00); Southwest Airlines, \$243.00 (\$227.00 to \$258.00); JetBlue Airlines, \$195.00 (\$142.00 to \$219.00), based on Airline Pilots Central data. Using the same 75-hour per month formula, that would equate to average annual salaries of \$244,800, \$231,300, \$218,700, and \$175,500 respectively, for pilots at those major air carriers.
- 50 Author's note: The estimates used Fiscal 2017 pay tables since, as of early February 2018, Congress has not approved Fiscal 2018 defense spending legislation, leaving the Air Force and rest of the US military to operate at Fiscal 2017 funding levels under budget continuing resolutions. Accordingly, base pay for a major (O-4) in early 2018 is \$6,887.40 per month * 12 months = \$82,648.80 a year. See: "2017 Military Pay Charts," MilitaryBenefits.info, <https://militarybenefits.info/2017-military-pay-charts/>. Aviation incentive pay for an O-4 with 11-years of service is \$700.00 per month * 12 months = \$8,400.00 a year. See: "Air Force announces initiatives to lessen pilot shortage," Secretary of the Air Force Public Affairs, Aug. 25, 2017, <http://www.af.mil/News/Article-Display/Article/1290397/air-force-announces-initiatives-to-lessen-pilot-shortage/>. Basic allowance for subsistence for an officer is \$253.63 per month * 12 months = \$3,043.56 a year. See: "2017 BAS (Basic Allowance for Subsistence) Rates," MilitaryBenefits.info, <https://militarybenefits.info/2017-bas-basic-allowance-for-subsistence-rates/>. Once the Fiscal 2018 defense appropriations legislation becomes law, Airmen will receive a 2.4% increase in base pay, 2.2% increase in BAH, and 3.4% increase in BAS. In Fiscal 2019, the Air Force is requesting a 2.6 percent increase in base pay, along with a 3.2 percent hike for BAH and 3.4 percent for BAS.
- 51 "2017 BAH (Basic Allowance for Housing) Rates," MilitaryBenefits.info, <https://militarybenefits.info/2017-bah-basic-allowance-for-housing-rates/>.
- 52 Scholz, email correspondence with author, Nov. 28, 2017.
- 53 Ibid.
- 54 Wilson and Goldfein, State of the Air Force Briefing.
- 55 Secretary of the Air Force Public Affairs, "Air Force announces initiatives to lessen pilot shortage," Aug. 25, 2017, <http://www.af.mil/News/Article-Display/Article/1290397/air-force-announces-initiatives-to-lessen-pilot-shortage/>.
- 56 SSgt. Jannelle McRae, "AF addresses pilot shortage," Secretary of the Air Force Public Affairs, March 30, 2017, <http://www.af.mil/News/Article-Display/Article/1135435/af-addresses-pilot-shortage/>.
- 57 SMSgt Allison Day, "AF to implement Second Assignment In-Place Pilot Program," Secretary of the Air Force Public Affairs, Sept. 7, 2017, <http://www.af.mil/News/Article-Display/Article/1301062/af-to-implement-second-assignment-in-place-pilot-program/>.
- 58 Barber, "Air Force facing growing crisis in pilot shortage."
- 59 Day, "AF to implement Second Assignment In-Place Pilot Program."
- 60 Kat Bailey, "Air Force expands Career Intermission Program opportunities," Air Force Personnel Center Public Affairs, Sept. 27, 2017, <http://www.arpc.afrc.af.mil/News/Article-Display/Article/1326146/af-expands-career-intermission-program-opportunities/>.
- 61 Author's note: The bonus levels vary depending on the pilot's career field, i.e., aviator's in more-stressed fields like the fighter force qualify for more. Details explained, Secretary of the Air Force Public Affairs, "Air Force announces significant changes to Aviation Bonus Program," June 5, 2017, <http://www.af.mil/News/Article-Display/Article/1202627/air-force-announces-significant-changes-to-aviation-bonus-program/>.
- 62 Author's note: Under the program, which began at the higher rate in August 2017, the Air Force offered eligible pilots contract options to extend their service by one-year, two-years, or five-years. There was also an additional nine-year contract option for bomber, mobility, and special operations pilots, while fighter pilots also had the nine-year option as well as a 13-year option that would bring them to their 24th year of aviation service. Some RPA pilots and combat systems operators were eligible for five-year contracts at varying amounts. The new rates meant a fighter pilot re-upping for 13 years would earn a maximum of \$455,000 in total bonuses over 13 years. Previously the highest bonus payout was \$225,000 over nine years. Bomber, special ops, and mobility pilots could receive up to \$30,000 a year for up to nine years, and reconnaissance and surveillance pilots and rescue pilots could earn up to \$28,000 a year for up to five years. See Stephen Losey, "Air Force rolls out 13-year, \$455,000 bonuses for fighter pilots," *Air Force Times*, June 5, 2017, <https://www.airforcetimes.com/news/your-air-force/2017/06/05/air-force-rolls-out-13-year-455000-bonuses-for-fighter-pilots/>.
- 63 Secretary of the Air Force Public Affairs, "Air Force announces initiatives to lessen pilot shortage."
- 64 Brian Everstine, "AMC Looking to Double Time at Bases for Pilots to Address Shortage," *Air Force Magazine's Daily Report*, Oct. 30, 2017, <http://www.airforcemag.com/DRArchive/Pages/default.aspx?Date=10/30/2017>; and Everstine, "AMC Considering 'Flying Only' Career Track," *Air Force Magazine's Daily Report*, Sept. 29, 2017, <http://www.airforcemag.com/Features/Pages/2017/September%202017/AMC-Considering-Flying-Only-Career-Track.aspx>.
- 65 SASC, "Advance Policy Questions for Shon Manasco, Nominee for Assistant Secretary of the Air Force for Manpower and Reserve Affairs," Nov. 9, 2017, 10, https://www.armed-services.senate.gov/imo/media/doc/Manasco_APQs_11-09-17.pdf.
- 66 Scholz, email correspondence with author, Dec. 8, 2017.
- 67 Losey, "Air Force: Pilots recalled under Trump order will serve as instructors, staff," *Air Force Times*, Oct. 23, 2017, <https://www.airforcetimes.com/news/your-air-force/2017/10/23/air-force-pilots-recalled-under-trump-order-will-serve-as-instructors-staff/>.

- 68 Bailey, "Retired Air Force pilots welcomed back on active duty," Air Force Personnel Center Public Affairs, Oct. 2, 2017, <http://www.afpc.af.mil/News/Article-Display/Article/1330125/retired-air-force-pilots-welcomed-back-on-active-duty/>; and "Air Force announces initiatives to lessen pilot shortage." Author's note: The older VRRAD program dates to 2001 legislation, according to Air Staff officials, and limits the service to 25 personnel and up to 12 months of service.
- 69 Scholz, email correspondence with author, Feb. 6, 2018.
- 70 Will Skowronski, "Pilot Shortage Back With a Vengeance," *Air Force Magazine* (2016), Vol. 99, No. 8, <http://www.airforcemag.com/MagazineArchive/Pages/2016/August%202016/Pilot-Shortage-Back-With-a-Vengeance.aspx>.
- 71 Barber, "Air Force facing growing crisis in pilot shortage.
- 72 Author's note: The training blocks in the pilot instruction pipeline, and the relative importance of each block to the training enterprise, are explored deeply in Maj Gen Lawrence A. Stutzriem, USAF (Ret.) with Marc V. Schanz, "Building Better Pilots: Considerations to Ensure T-X Success," *The Mitchell Forum* No. 8, December 2016 (Arlington, VA: The Mitchell Institute for Aerospace Studies), 6-8.
- 73 Author's note: The Air Force Academy offers aviation and airmanship courses, giving cadets the opportunity to soar in gliders and solo in a propeller-driven aircraft.
- 74 Author's note: See Stutzriem, "Building Better Pilots," for more on the importance of preparing airmen properly for the next block of pilot training, and the personnel strains resultant on the experienced pilot cadre when the training pipeline does not function properly.
- 75 Author's note: ENJJPT features undergraduate student pilots from the Air Force and the partner nations as well as instructor pilots from the Air Force and partner air forces. The wing also trains NATO pilots to be instructor pilots, fly fighters, and instruct other pilots to fly fighters. Fourteen NATO members are signatories to the ENJJPT memorandum of agreement and participate to varying degrees. Nine, as of November 2017, contributed student pilots and instructor pilots: the United States, Belgium, Canada, Denmark, Germany, Italy, the Netherlands, Norway, and Turkey. Two sent only instructor pilots: Greece and Spain. Portugal, Romania, and the United Kingdom were currently non-active signatories. However, Romania and Spain were poised to start sending students and Portugal and the United Kingdom were considering greater participation, according to the 80th FTW.
- 76 Ibid and 71st Flying Training Wing Public Affairs, "Vance Air Force Base, Oklahoma" fact sheet, last updated March 2017, <http://www.vance.af.mil/Portals/61/Docs/Fact%20Sheets/Vance%20Fact%20Sheet--2017%20Update--t1s.pdf?ver=2017-02-28-091814-167>. Author's note: AETC considers initial flight training to be phase zero of SUPT.
- 77 Department of the Air Force, "T-6A Texan II" fact sheet, last updated March 28, 2003, <http://www.af.mil/About-Us/Fact-Sheets/Display/Article/104548/t-6a-texan-ii/>.
- 78 AETC, written responses to author query, and "Vance Air Force Base, Oklahoma" fact sheet.
- 79 Department of the Air Force, "T-1A Jayhawk" fact sheet, last updated Sept. 14, 2005, <http://www.af.mil/About-Us/Fact-Sheets/Display/Article/104542/t-1a-jayhawk/>.
- 80 AETC, written responses to author query.
- 81 Ibid and SrA Soochan Kim, "How to become an Air Force pilot," Air Force Social Media Team, June 28, 2015, <http://airforcelive.dodlive.mil/2015/06/how-to-become-an-air-force-pilot/>.
- 82 AETC, written responses to author query.
- 83 Ibid.
- 84 80th Flying Training Wing, "Our Challenges and the Importance of Fully Funding the Air Force and Repealing the Budget Control Act" fact sheet, November 2017.
- 85 Department of the Air Force, *Air Force Instruction 11-402: Aviation and Parachutist Service, Aeronautical Ratings, and Aviation Badges*, updated Sept 11, 2017, 27-30, http://static.e-publishing.af.mil/production/1/af_a3/publication/afi11-402/afi11-402.pdf.
- 86 Doherty, author interview, Oct. 16, 2017.
- 87 Koscheski, author interview, Oct. 24, 2017.
- 88 MSgt Joshua P. Strang, "AETC explores learning possibilities through new pilot training program," Air Education and Training Command Public Affairs, Dec. 7, 2017, www.aetc.af.mil/News/Article/1391431/aetc-explores-learning-possibilities-through-new-pilot-training-program/, and John Ingle, "ENJJPT leading the way in new Pilot Training Next program," 82nd Training Wing Public Affairs, Dec. 22, 2017, www.aetc.af.mil/News/Article/1404638/enjjpt-leading-the-way-in-new-pilot-training-next-program/.
- 89 Air Force Lt Gen Steven Kwast, commander, AETC, author interview.
- 90 Drichta, author interview, Nov. 14, 2017.
- 91 Ibid, Oct. 16, 2017.
- 92 AETC, "Comprehensive Pilot Training Analysis: White Paper," September 2016, 3.
- 93 Drichta, author interview, Nov. 14, 2017.
- 94 Secretary of the Air Force Public Affairs, "AF selects Holloman AFB as preferred location for interim F-16 training squadrons," Nov. 17, 2016, <http://www.af.mil/News/Article-Display/Article/1007981/af-selects-holloman-afb-as-preferred-location-for-interim-f-16-training-squadro/>.
- 95 A1C Alexis P. Docherty, "8th Fighter Squadron reactivated after six years," 49th Wing Public Affairs, Aug. 4, 2017, www.holloman.af.mil/Article-Display/Article/1269221/8th-fighter-squadron-reactivated-after-six-years/.
- 96 Brig Gen Brook J. Leonard, USAF (commander, 56th Fighter Wing), author interview, Nov. 22, 2017.
- 97 Gilbert J. Montoya, USAF (director of logistics, engineering, and force protection, Air Education and Training Command), author interview, Oct. 16, 2017.
- 98 AETC, "AETC Snapshot: Air Education and Training Command Communication Waypoints," November 2017, <http://www.aetc.af.mil/Portals/88/Documents/Snapshot/AETC%20Snapshot%20November%202017%20Final.pdf?ver=2017-11-21-134541-107>. Author's note: AETC published the snapshot prior to the fatal crash of a T-38 on Nov. 20, 2017, near Laughlin AFB, TX. Accordingly, the T-38 inventory number used in the paper is one less AETC listed on the snapshot.
- 99 Author's note: Aircraft availability is a fleet-wide metric that indicates how many airframes of a specific aircraft type are available for use and not unavailable for an extended period due to reasons like being in depot for scheduled maintenance. The mission-capable (MC) rate reflects the number of airplanes of a specific type within a squadron that are not only available for use, but also actually ready for use and not down due to unforeseen mechanical issues. Thus, available aircraft are not always mission-capable, so MC rates provide more fidelity into the health of an aircraft type.

- 100 A1C Benjamin N. Valmoja, "XL maintainers knocking out hangar queens," 47th Flying Training Wing Public Affairs, April 28, 2017, <http://www.laughlin.af.mil/News/Article-Display/Article/1166997/xl-maintainers-knocking-out-hangar-queens/>.
- 101 2nd Lt Mickel P. McGann, USAF (spokesman, 47th Flying Training Wing Public Affairs), email correspondence with author, Dec. 12, 2017.
- 102 Charles L. Webb, USAF (director, 47th Maintenance Directorate), author interview, Oct. 17, 2017.
- 103 Drichta, author interview, Oct. 16, 2017.
- 104 Drichta, author interview, Nov. 14, 2017.
- 105 Leonard, author interview, Nov. 22, 2017.
- 106 Kiley Dougherty, USAF (deputy, 56th Fighter Wing Public Affairs), written response to author query, Nov. 21, 2017.
- 107 Ibid.
- 108 Ibid. Author's note: Due to partner sensitivities, the wing was unable to provide a more detailed breakdown of the instructor pilots' nationalities and cadre numbers.
- 109 AETC Headquarters Public Affairs, written responses to author query, Dec. 8, 2017.
- 110 Doherty, author interview, Oct. 16, 2017.
- 111 Col Andrea Themely USAF, author interview, Nov. 13, 2017.
- 112 80th Flying Training Wing, "Our Challenges and the Importance of Fully Funding the Air Force and Repealing the Budget Control Act" fact sheet, November 2017.
- 113 Col Joel L. Carey, USAF (commander, 12th Flying Training Wing), author interview, Oct. 16, 2017.
- 114 Themely, author interview.
- 115 Root, author interview, Nov. 16, 2017.
- 116 Drichta, author interview, Nov. 14, 2017.
- 117 Holmes, "Readiness on the Line: Preparing Today's Force for Future Fights."
- 118 Wilson and Goldfein, State of the Air Force Briefing, Nov. 9, 2017.
- 119 Themely, author interview, Nov. 13, 2017.
- 120 Leonard, author interview, Nov. 22, 2017.
- 121 Kwast, author interview, Nov. 29, 2017.
- 122 Author's note: For a broader discussion of the T-X program, see: Maj Gen Lawrence A. Stutzriem, USAF (Ret.), with Marc V. Schanz, *Building Better Pilots: Considerations to Ensure T-X Success*, The Mitchell Forum (Arlington, VA: Mitchell Institute, 2016), No. 8, http://docs.wixstatic.com/ugd/a2dd91_4d38b0c0fb824d7baf2bdbdfe322e1f7.pdf.
- 123 Scholz, email correspondence with author, Nov. 22, 2017.
- 124 Capt Jason Smith, "T-X, future T-38 jet replacement, requirements released," AETC Public Affairs, March 20, 2015, <http://www.af.mil/News/Article-Display/Article/581073/t-x-future-t-38-jet-replacement-requirements-released/>.
- 125 Kwast, author interview.
- 126 Webb, author interview.
- 127 AETC, "Comprehensive Pilot Training Analysis: White Paper," September 2016, 2-3.
- 128 Author's note: These observations are drawn from the Mitchell Institute research paper by Heather Penney, "Female Officer Retention and the Millennial Imperative: Transforming Force Management into Talent Management," Working Paper – *Mitchell Institute Policy Papers*, anticipated 2018 release.
- 129 House Armed Services Committee's readiness panel, hearing on Air Force Readiness Posture.
- 130 Heather Penney, author interview, Apr 13, 2018.
- 131 Department of the Air Force, "Fiscal Year (FY) 2019 Budget Estimates, February 2018: Operations and Maintenance, Air Force, Volume 1," 76, <http://www.saffm.hq.af.mil/Portals/84/documents/FY19/OM/Air%20Force%20Operations%20and%20Maintenance%20Vol%20I%20FY19.pdf?ver=2018-02-12-184428-553>; and Oriana Pawlyk, "Inside the Air Force's Plan to Buy the Dogfight Training of Tomorrow," Military.com, Sept. 25, 2017, <https://www.military.com/daily-news/2017/09/25/inside-air-forces-plan-buy-dogfight-training-tomorrow.html>.
- 132 Cmdr Ronald S. Flanders, USN (spokesman, Commander, Naval Air Forces), written responses to author query, Nov. 28, 2017. Author's note: For context, between Fiscal 2013 and Fiscal 2017, approximately 540 pilots graduated Navy flight training each year (242 rotary wing, 163 multi-engine, 135 strike), according to Flanders.
- 133 Dov Schwartz, USA (spokesman, Army Headquarters Public Affairs), written response to author query, Jan. 11, 2018. Author's note: The Army expects to produce about 1,200 pilots in Fiscal 2018.
- 134 L3 Doss Aviation officials, author interview during initial flight training site visit, Pueblo Memorial Airport, Pueblo, CO, Oct. 10, 2017.
- 135 Mark Maryak, L3 Doss Aviation (chief pilot, initial flight training), author interview during site visit, Oct. 10, 2017.
- 136 Pekarek, author interview, Oct. 17, 2017.
- 137 Author's note: The author interviewed this SUPT graduate in fall 2017 and is respecting this airman's desire to remain anonymous.
- 138 Author's note: Warrant officers are technical experts in grades that fall below commissioned officers, but above enlisted personnel, who specialize in a particular battlefield skill, such as flying helicopters.
- 139 Ibid.
- 140 Author's note: These observations are drawn from the forthcoming analysis: Lt Col Michael Buck, USAF (Ret.) with Maj Gen Lawrence Stutzriem and Douglas Birkey, "Light Combat Aircraft: An Essential for American Airpower," *Mitchell Institute Policy Papers*, Vol. 11, May, 2018, 18.
- 141 SSgt Alyssa C. Gibson, "SECAF, CSAF direct review of all Air Force programs," Secretary of the Air Force Public Affairs, Dec. 6, 2017, <http://www.af.mil/News/Article-Display/Article/1389784/secaf-csaf-direct-review-of-all-air-force-programs/>.
- 142 Carl Conetta and Charles Knight, "The Readiness Crisis of the US Air Force: A Review and Diagnosis," Project on Defense Alternatives Briefing Report, no. 10 (1999), www.comw.org/pda/afread01.html.

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