

AU/ACSC/2016

AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

GROUNDING THE RPA FORCE: WHY MACHINE NEEDS MAN

by

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A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

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June 2016

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TABLE OF CONTENTS

	<i>Page</i>
DISCLAIMERii
TABLE OF CONTENTS.....	.iii
FIGURES.....	.iv
PREFACE.....	iv
ABSTRACT.....	.vi
INTRODUCTION	1
HISTORY6
CHALLENGES OF MANNED FLIGHT.....	.8
THE RPA RISES: A GROWING NEED FOR UNMANNED OPERATIONS.....	13
CHALLENGES OF UNMANNED FLIGHT.....	15
JUSTIFYING AN 18X TRANSFORMATION	20
RECOMMENDATION	20
Embrace the 18X Culture—Highlight the Career Field in Air Force Media.....	21
Modify Training Standards for 18X Candidates.....	23
Rename the 18X Career Field.....	26
CONCLUSION.....	29
NOTES.....	31
BIBLIOGRAPHY.....	36

FIGURES

	<i>Page</i>
Figure 1.1. Average Procurement Cost for Fighter Aircraft by Fiscal Year.....	10
Figure 1.2. Air Force Anticipated Fighter Pilot Attrition Rate.....	11
Figure 2.1. Expansion of Drone Operations 1995-2015.....	13
Figure 2.2. MQ-9 Reaper Draft Spending Plan.....	14
Figure 3.1. RPA Pilot Survey.....	18
Figure 4.1. 18X Training Pipeline.....	24
Figure 4.2. Elements of Job Satisfaction.....	29



PREFACE

Before embarking on this thesis, the intent was to speak to future Remotely Piloted Aircraft (RPA) capabilities needed by the Air Force to achieve air superiority in future conflicts. However, it was discovered that ideas had already been presented as the research unfolded. Organizations such as The Rand Corporation as well as other military professionals have published papers that write to technological advancements, such as improved sensors to advanced tactics, such as remote aircraft swarms and multiple RPA controlled by a single pilot. However, in order to be successfully implemented all of these technologies and tactics will still require the presence of an operator, or “man.” This paper focuses on the need for the Air Force to address the 18X career field and proposes several solutions to address the current manning crisis. In simple terms, without a group of trained professionals skilled in RPA operations, the RPA fleet may very well be grounded.

There are three groups people I would like thank, who all helped me along the way in this journey. First, Dr. Chris Johnson and Dr. Heather Marshall who consistently pushed me to research more, improve quality, and also served as a weekly lesson in humility. Next, my peers who took time out of their lives to review drafts, provide constructive criticism and also serve as a sounding board for ideas and frustration’s. Last, and certainly not least, my wife, son, and in-laws. They all had to deal with my consistent absences and stress as I worked to balance civilian job and military careers, travel for both, and demands of school over the past two years. I know this process has not been easy on my family, but their love and support was unwavering throughout this entire process.

ABSTRACT

The 2015 Air Force Future Operating Concept, presents an overarching framework as to how the Air Force will provide global vigilance, reach, and power through the application of “operational agility” to meet and resolve challenges in the year 2035. More recently, the Air Force published its Air Superiority 2030 Flight Plan, which calls for an integrated “family of systems” to achieve air and space superiority in future conflicts. A significant part of the solution in both publications involves the application of Remotely Piloted Aircraft (RPA) in a combat role to accomplish mission objectives. While RPAs have been in use for over a decade, the demand for their employment has been drastically increasing. The amount of trained personnel required to operate attack RPAs, however, has been on the decline, generating a manning crisis in this career field. Grueling operational hours, the introduction of mental and emotional stressors, the perception of inequality amongst peers, and lower school and promotion selection rates have led to highly qualified RPA operators ejecting from the Air Force after completion of their service commitment. As a result, the current RPA pilot retention rates will prevent the Air Force from meeting the demand of 2035, even with the advancements of technology.

This research paper proposes that the Air Force needs to transform the RPA pilot career field and provide the same advancement opportunities as the rest of the Air Force pilot community to improve retention and recruitment. Specifically, it should address how the RPA community is advertised to the world, how RPA candidates are trained and consider renaming the career field altogether. Failing to address the problems facing the RPA force may cause the Air Force to continue on its path of fostering a toxic relationship from within the pilot community, lose experienced Airmen, and ultimately be unable to meet the challenges it will face in 2035 .

Introduction

In November of 2015, an aircraft flying at 10,000 feet launched two hellfire missiles at Mohammed Emwazi, more commonly known as “Jihadi John” after determining his location in Raqqa, Syria. Emwazi had become notorious for his role in beheading Western captives.¹ It was not an expensive, fifth-generation fighter that made the kill. Rather, the unmanned MQ-9 Reaper was being flown by its pilot from Creech Air Force Base in Nevada, just outside of Las Vegas. The flawless mission that culminated in the successful targeting of Emwazi is an excellent example of the significance and impact RPAs can provide to the US and why the demand for RPA operations is only increasing. Many RPA operators are working 13-hour shifts, six days a week, in order to fulfill the demand for these types of missions. Along with other factors, this operational tempo is causing RPA operators to leave military service as soon as their obligation has been satisfied. The Air Force is losing its battle to retain skilled RPA operators and as a result, is facing a potential shortfall to meet the anticipated future demand of RPA capabilities.

In “A View of the Air Force in 2035,” Secretary of the Air Force Deborah Lee and Air Force Chief of Staff General Mark A. Welsh III reaffirmed the need for the capability to conduct combat operations globally within hours, minutes or even seconds. The Air Force will use “...remotely operated, semi-autonomous, and autonomous assets”² to execute networked global operations across the full range of military operations³ – whether it is responding to the activities of an insurgent group or executing major air operations against near-peer adversaries. However, dismal retention rates coupled with the treatment of unmanned pilots as second-class citizens will prevent the Air Force from meeting its goal unless the culture and perceptions are changed from within the Air Force.

Manned aircraft alone will not be able to fulfill the requirement for air superiority, given the Air Force's goals and fiscal challenges. In fact, in some cases manned aircraft may not even be preferred as the tool of choice for the Air Force. Between 2014 and 2016 alone, fiscal year (FY) budget estimates project an approximate 14 percent reduction.⁴ At the same time, costs for the next generation of manned fighter aircraft have been skyrocketing. The F-35 has increased program costs from an estimated \$7.6 billion in FY 2013 to \$8.3 billion in FY 2015.⁵ Due to advanced capabilities such as infrared cameras that enable a pilot to "look through"⁶ the airframe, the helmet alone costs an estimated \$400,000, which is approximately \$300,000 more than the cost of the Joint Helmet Mounted Cueing System (JHMCS) currently worn by F-15C, F-15E, F-16, and A-10 pilots.⁷ Additionally, the Air Force's requirement to add more capability yields a heavier aircraft. The single-cockpit F-35 weighs an estimated 35 tons (70,000 pounds) when fully fueled,⁸ versus an MQ-9 Reaper that weighs a mere 5,000lbs by comparison.⁹ The added weight of the Air Force's advanced fighters will ironically decrease aircraft range, just as it faces more challenges to project power abroad and Anti-Access/Area Denial (A2/D2) circles grow around adversarial states. The bottom line is that Air Force future-generation, manned fighter aircraft are becoming more and more expensive to develop, operate, and support, while allocated budgets are not enough to sustain this growth. When compared to fighters, the cost of RPA platforms are significantly lower. A single F-22 Raptor costs the US approximately \$186 million to produce whereas the MQ-9 Reaper has a production cost of \$6.48 million.¹⁰ In addition to the direct cost savings, the quantity of RPAs required to execute the same combat missions as manned aircraft would enable the Air Force to reduce its fleet size by approximately 75% in some cases,¹¹ reducing budgetary strain on a fiscally stressed force.

Additionally, the capabilities and advantages RPAs and their operators bring to the fight cannot be argued. RPAs have flown sorties of up to 80 hours in length,¹² far beyond the authorized limitation of any manned aircraft. A RPA's lack of operational limits can prevent mission gaps that present themselves as a result of a manned aircraft departing the operational environment due to human (e.g., fatigue) or aircraft (e.g., refuel) requirements. Given the ability to execute more missions with the same effectiveness, the demand for RPA capability has been increasing, with a 1,200 percent growth alone in Afghanistan as field commanders began to appreciate the RPA's combat effects.¹³ The demand growth for RPA operations can even be seen at the White House level of operations. The Obama Administration touts RPA operations as a major success in the fight against Al Qaeda while keeping civilian casualties to a minimum and avoiding putting US troops in harm's way. RPA's have become a surgical tool for the Obama Administration, especially when compared to President Bush's time in office. President Bush authorized approximately 50 RPA strike, which were reported to have killed 296 terrorists. During his tenure in office, President Obama authorized a total of 506 RPA strikes, which have been reported to have killed 3,040 terrorists.¹⁴

It is clear that at the tactical, operational and strategic level of military operations, the growth in RPA operations is significantly growing. However, in order to accommodate this demand, more RPA operators are required, but the Air Force only has roughly 70 percent of the force it needs.¹⁵ However, for RPAs to actually provide the benefits they are designed to give, human operators are still required. Without an operator to fly the RPA, it essentially is an expensive static display that cannot perform its operational mission.

Unfortunately, the Air Force has a difficult time retaining RPA pilots, in large part because the operational demand and tempo of RPA operators is grueling. RPA crews sit at a console for

13-14 hour shifts operating their aircraft.¹⁶ The RPA operator force is overworked to the point retention is plummeting. In 2014, the Air Force had 1,366 personnel operating RPA, which was about 85 percent of the total strength needed at the time.¹⁷ Just one year later, the number of personnel operating RPAs dropped to 1,000, or roughly 62% of the pilots needed to sustain steady RPA operations.¹⁸ Even the Air Force admits the primary reason for the poor retention is simply because they are overworked due to an “unrelenting pace of operations.”¹⁹ The bottom line is that demand significantly outweighs supply.

In addition to the arduous workload, cultural tensions that exist within the Air Force between RPA and manned pilots have created a demoralizing environment for the RPA pilot. Traditional pilots treat RPA operators as second-rate aviators²⁰, and promotion board results have proven that pilots of RPA platforms do not compete nearly as well for promotion and school selection when compared to their traditional counterparts.

As demand for RPA operations increase, the Air Force must reassess how it values its RPA operators. The Air Force needs to transform the 18X career field to address how RPA operators really “fit” within the larger Air Force. Instead of a skilled pilot who flies an aircraft from within a cockpit, the Air Force should focus on the individual who operates an aircraft to accomplish specific missions in order to transform the career field and recognize that just because these operators are not on the battlefield, they are just as much in the fight as their manned aircraft counterparts. Pilots used to “turn and burn,” but now they are more likely to “click and drag” when operating a RPA. The career field shift will help recognize the value added by RPA operators and establish a foundation to balance the equality from within the pilot community. This transition should positively impact school selections for developmental professional

military education, promotions, and in turn, improve morale, thus increasing retention of RPA operators for the Air Force and modifying the culture.

In order to assess the problem and recommend possible solutions, the transformative framework will be used for this research. The problem is that RPA attack operators are considered pilots according to their Air Force Specialty Code (18X), but in reality, they are not really pilots as much as they are platform operators. RPA pilots fly from a desk, not a cockpit and possibly from thousands of miles away from where the aircraft is physically operating. Placing them in a same career category as a traditional pilot has led to them being treated as second-class citizens. In order for the career field to transform, the Air Force must consider renaming the 18X career field and assess how it recruits, trains and retains RPA operators.



History

Since the introduction of military aircraft in World War I (WWI), there has been debate regarding how to best apply airpower. Initially, the airplane was seen as a tool to support ground forces. At the onset of WWI the airplane was mainly used for surveillance and reconnaissance. A pilot would take off from their base, fly over the adversary's position on the battlefield, return to base, and then report their findings to inform ground commanders on troop movements and provide information to execute artillery strikes.²¹ As a result, the aircraft was not an offensive weapon until Roland Garros demonstrated the ability to fly and attack in 1915. Garros attached deflector plates onto his aircraft's propeller, protecting the blades from the aircraft's own firing, keeping the plane airborne and making it an offensive weapon. While the solution was not necessarily efficient, it was effective. As a result of his ingenuity, Garros is credited as one of the first pioneers of fighter aviation.²²

Even though Garros demonstrated a capability for the aircraft to be used as an offensive weapon of war, the US Army resisted the benefits airpower could provide. The military community did not see the aircraft as an offensive tool in practice until Colonel Billy Mitchell proved the value of airpower and demonstrated its effectiveness in combat. A strong advocate of airpower, Col Mitchell openly critiqued Allied nations for improperly using the airplane. Mitchell viewed the airplane as an offensive tool that would enable a nation to continue an attack, even if an adversary was advancing. Mitchell also advocated for an airpower strategy to attack an enemy's supply lines to stop the advance of the adversary, versus bombardment from the front of the fight.²³ While Mitchell's strategy was untested by the US at the time, it was not until the Battle of Saint-Mihiel that he proved his beliefs to the military at large.

During the Battle of Saint-Mihiel, which began on September 11th, 1918, Mitchell was finally able to put the war's first flying squadron into combat. As a result of the German's aggressive push against Allied forces, Mitchell coordinated a massive force of 1,481 French, British and Italian aircraft to execute a coordinated and decisive attack against Germany,²⁴ which was the greatest concentration of airpower ever comprised. Mitchell's squadron was to provide information to US and Allied ground forces, obtain air superiority and attack Germany's supply lines and troop movements.²⁵ Over the course of four days, the German forces were defeated and victory was claimed by the US and Allied forces. While airpower alone did not win the Battle of Saint-Mihiel, it was a significant contributor.²⁶ Mitchell's application of airpower was unprecedented at the time, and the Battle of Saint-Mihiel proved the offensive wartime effects of the airplane in war could be decisive. As a result of his efforts and with advancements in technology, the opinion of the aircraft began to change. The airplane was no longer viewed as a tool to support ground forces – it was beginning to be viewed as an offensive weapon that could help turn the tables during war and obtain victory. The effect Mitchell had on the military was made permanent through the National Security Act of 1947. On July 26th, 1947 the United States formally declared the Air Force an official branch of the Armed Forces.²⁷ Since 1947, the fighter jet has been greatly improved upon. They can fly faster and higher, are more maneuverable, can re-fuel in flight and even come with stealth technology to make them less detectable. However, with all of these advancements, there are still problems with manned flight that the Air Force is facing today and could greatly impact the success of tomorrow.

Challenges of Manned Flight

The Air Force is facing some significant challenges related to its manned fighter branch of operations. Specifically, the cost of developing, acquiring and sustaining advanced fighter platforms coupled with a manning crisis where pilots are fleeing the service after their Air Force commitments have been served. While this paper does not address the manned fighter issues, an inability to sustain fighter aircraft requirement levels and the pilots required to fly them could translate into increased reliance on RPA attack operations. This relationship between manned and unmanned aircraft is important to understand when suggesting a transformation to the RPA career field.

While the Air Force has maintained air supremacy since its inception, the cost of doing business is growing at an alarming rate. The US Congress mandated the Air Force “maintain 1,900 fighter aircraft” in its inventory past 2021. Currently, the Air Force just meets the requirements, with a total of 1,971 aircraft in its inventory.²⁸ However, recent budget analysis completed by the Pentagon predicts that the Air Force will not be able to afford its required fighter fleet beyond 2021 due to the retirement of aging aircraft, and the growing cost of advanced fighter aircraft.²⁹

Due to enhanced capabilities, advanced fighter aircraft cost much more than their predecessors. The F-22 Raptor program, which ended its production in 2010, cost the Department of Defense approximately \$67.3 billion (including research, development, procurement and construction) with an average unit cost of \$185.7 million each for an inventory of 179 F-22s.³⁰ In comparison, the Air Force’s F-16 Fighting Falcon totaled a cost of \$16.7³¹ million per aircraft in 1998.³² Even when adjusting for inflation, a single F-16 today would only cost the Air Force approximately \$24.5 million each.³³ The added capabilities and growing cost

of the F-22 resulted in a cost growth of approximately 658 percent when compared to the F-16. Looking at the fighter community as a whole, the average unit procurement cost of fighter aircraft has risen from approximately \$10 million in 1974 to well over \$100 million in 2005 (Figure 1.1).³⁴

Recently, the Daily Beast reported the Air Force may not produce any manned fighter aircraft after completion of the F-35. Citing reasons such as excessive cost, difficulty of development, procurement, maintenance challenges and advancements of adversarial defense capabilities, the F-35 may be the last manned fighter program for the Air Force.³⁵ Furthermore, the Air Force's "Air Superiority 2030 Flight Plan" predicts that in order to achieve the future of air superiority against adversaries with an increased range of Anti-Access/Area Denial (A2/AD) capabilities the "Air Force needs to develop a family of capabilities that operate in and across the air, space and cyberspace domains. There is no single capability that provides a "silver bullet" solution."³⁶ This marks a significant change in approach, since the plan to attain air superiority does not specifically mention manned fighter aircraft platforms. The bottom line is a reliance on manned fighter aircraft alone, may realistically result in an inability for the Air Force to attain air superiority. However, funding, cost growth, and technological advancements are not the only challenges facing the manned fighter community.

The Air Force is facing a manning shortage within its pilot community. The Air Force reported that it is 520 fighter pilots short of its need and the gap is growing by approximately 170 fighter pilots per year as of September of 2015.³⁷

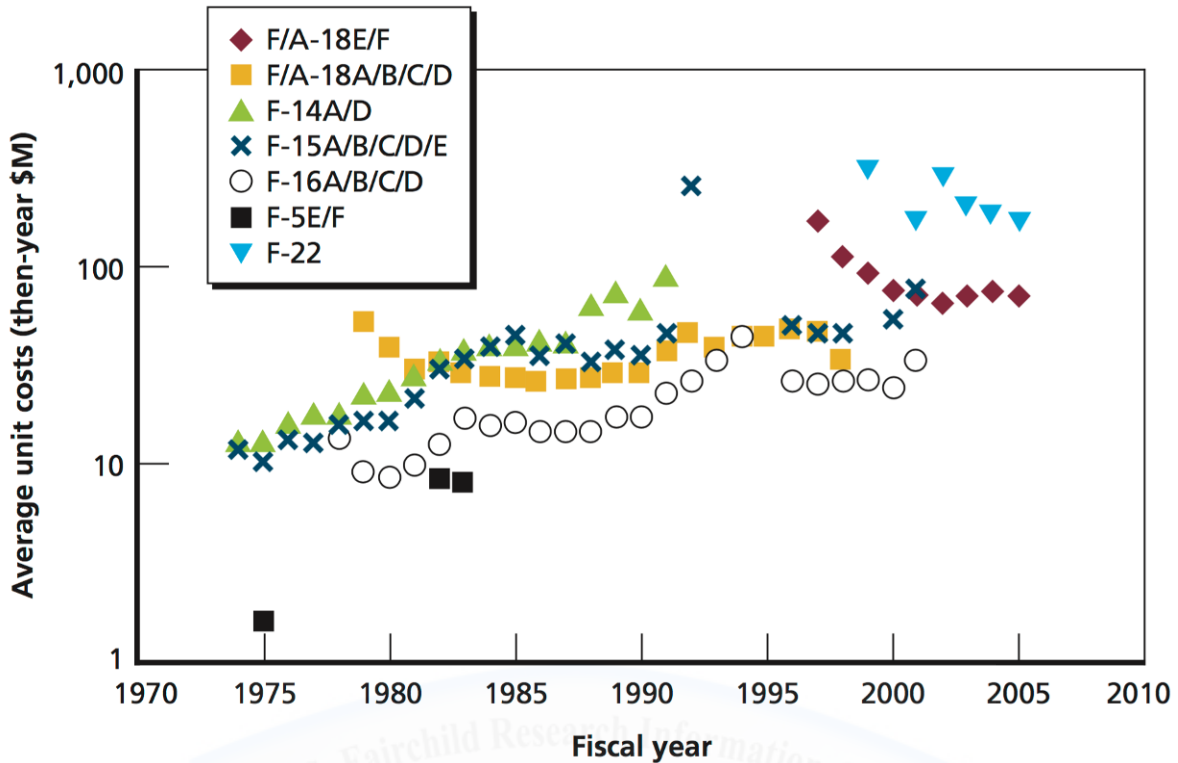


Figure 1.1: Average Unit Procurement Costs for Fighter Aircraft by Fiscal Year (Department of Defense)

In addition, the rate at which fighter pilots are taking a career field bonus (extending their service commitment) has dropped from 63 percent in FY2013 to 48 percent in FY2015. In FY16 alone, the Air Force expects to lose 387 pilots to attrition but expects to train only 200 new pilots (Figure 1.2).³⁸ By 2022, the Air Force is anticipating the fighter pilot deficit to grow by more than 800.³⁹



U.S. AIR FORCE

FY 16 RegAF Fighter Pilots

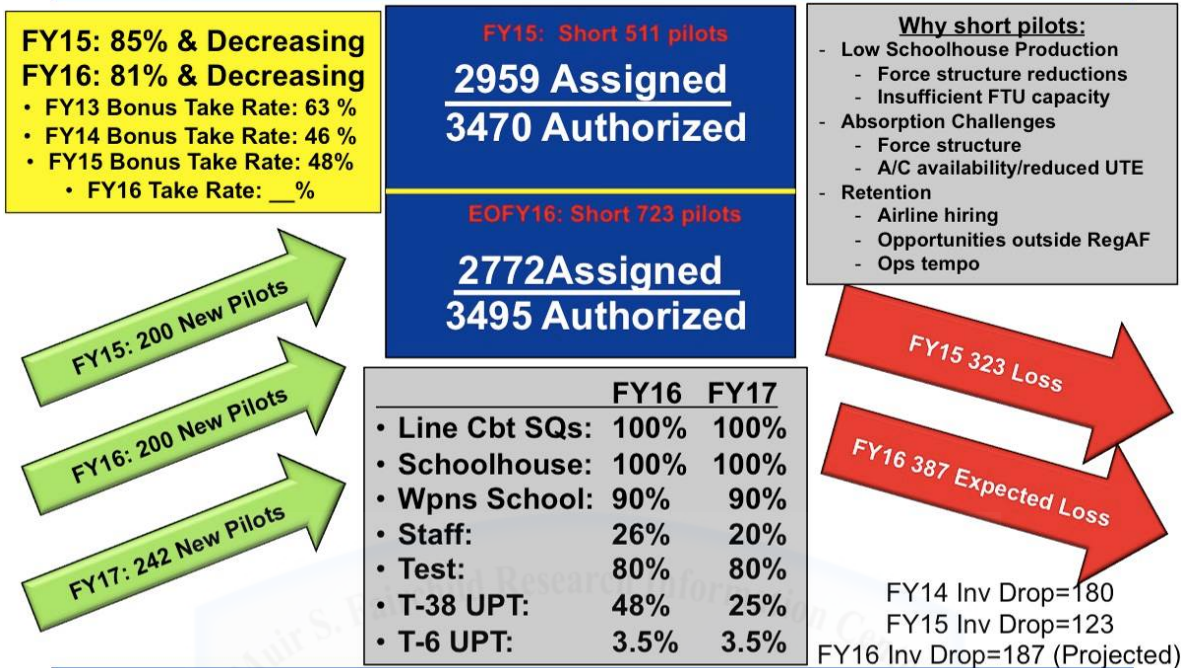


Figure 1.2: Anticipated Attrition of Fighter Pilots, (US Air Force)

When addressing why so many pilots are ejecting from their Air Force careers, there seems to be two significant factors – recruitment from the commercial airline industry and problems within the Air Force itself. The first significant factor as to why so many pilots are leaving is due to the shortage of pilots in the commercial industry, which can offer much higher salary and a more stable lifestyle for the members and their families. An Air Force pilot in the rank of Major will make approximately \$114,800 a year, whereas a commercial airline pilot can earn up to \$176,601 annually. As airlines expand their business operations, and pilots from the Baby Boomer generation retire, commercial airlines are expected to hire approximately 20,000 pilots by 2025. The Federal Aviation Administration recently changed the requirements of commercial pilots and co-pilots to have at least 1,500 hours of flight time. The previous requirement for co-pilots was 250 hours, so in order to meet demand, airlines are looking to the

Air Force because of the amount of flying experience pilots accumulate at such a young stage in their career.⁴⁰

While money is often a motivator to change careers, several articles have recently been written to indicate there may be problems within the Air Force itself. Many pilots agree that the Air Force is suffering from “an ailing organizational culture, a lack of mission focus, and excessive operational tempo.”⁴¹ Pilots have seen their flight hours slashed, and complain “they have morphed into flight suit wearing office managers,” where promotions are given to officers with better political prowess versus talent in the cockpit.⁴²

Applying the known data of today it is clear that the Air Force may be unable to afford the future of manned fighter aircraft. Even if the Air Force modifies their budgets and requirements to fund the needed equipment, it appears that it may not have the manning to support the congressionally mandated 1,900 fighter aircraft in its fleet due to dismal retention rates. The Air Force Operating Concept 2035 proposed to cope with these facts by transitioning to a blend of manned and RPA aircraft to sustain operations. This change in approach drives a critical need for RPA operations in order to attain air supremacy in the future. Even in today’s military operations, the reliance on RPA is growing each year.

The RPA Rises: A Growing Need for Unmanned Operations

Almost 100 years after one of the most prominent displays of airpower by Gen Mitchell, the Air Force is still revolutionizing the business of airpower. Along with the desire to change the way business is conducted, the Air Force should also consider transforming the RPA career field. By the year 2035 the Air Force envisions a fully integrated force of both manned and unmanned platforms to conduct missions across the full spectrum of airpower, be it refueling, resupply, intelligence, or combat operations. Numerous scenarios describe environments where manned platforms fly alongside RPA systems such as multi-mission long range (MMLR) aircraft. In these scenarios, MMLRs are integrated with F-35s and future advanced attack aircraft, such as the proposed AT-X designed to provide close air support.⁴³ While the vision of 2035 assumes realizing technologies not yet available, the Air Force of 2016 relies on unmanned platforms to effectively execute a wide array of missions, to include RPAs for strike operations like the one that targeted and destroyed Mohammed-Emwazi. Today, RPAs are proving their worth and demand for them is on the rise.

Expanding drone operations

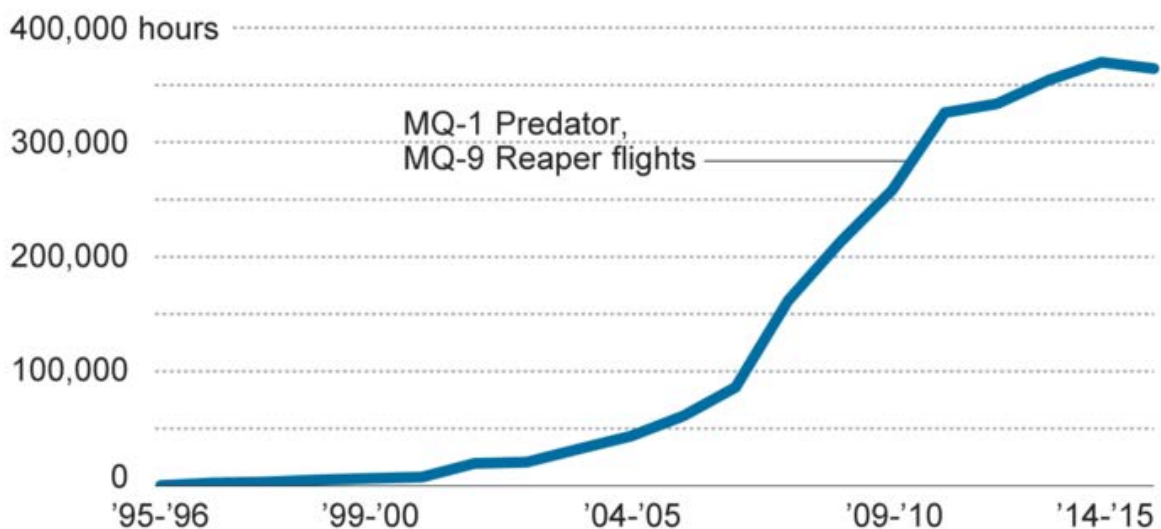


Figure 2.1: Expansion of Drone Operations (U.S. Air Force Safety Center)

The Pentagon announced plans in 2015 to increase the amount of RPA flights by 50 percent in order to meet the ever-growing demand.⁴⁴ Specifically looking at attack RPA operations, the amount of operational hours of the MQ-1 Predator and the MQ-9 Reaper has skyrocketed from less than 100,000 hours to over 350,000 hours between 2004 and 2015 (Fig 2.1).⁴⁵ The Air Force requested a 32 percent budget increase for MQ-9 operations between 2015 and 2016 in order to meet the anticipated operational demand (Fig 2.2).⁴⁶

	Item	Base	OCO	Total	FY16	FY15
Procurement	Aircraft and GCS	122.5	453	575.6	627.4	418.2
	Spares	40.9	0	40.9	129.3	76.6
	Modifications	141.9	112.1	254	184.1	155.5
	Other - Production	35.7	0	35.7	5	48.6
	Special Operations Command	10.6	0	10.6	17.2	18.6
Research	Upgrades	30.9	0	30.9	0	0
	Development	120.5	0	120.5	122.7	141.6
	Special Operations Command	17.8	0	17.8	22.2	14.4
	Missile Defense Agency	105.1	0	105.1	69.8	53.4
	Construction	0	10.5	10.5	72	21
	Total	625.9	575.6	1201.5	1249.6	947.8

Figure 2.2: Draft MQ-9 Draft Reaper Budget (Permission Granted by the Center for the Study of the Drone)

Additionally, the Air Force wants to increase its MQ-9 Reaper fleet by 75 aircraft along with 3,500 personnel to create an extra nine squadrons, providing the Air Force a total of 17 Reaper

squadrons. Beyond expanding the quantity of RPAs in its fleet and the amount of squadrons, the Air Force wants to establish new operations centers throughout the US to respond to demand from combatant commanders.⁴⁷ In total, the Air Force is planning on committing \$3 Billion to expand RPA capability. However, given the current state of affairs, the Air Force has a problem beyond money and equipment. Similar to the manned fighter aircraft community, the Air Force must find a way to retain a skilled force of trained RPA operators in order to marry man with the machine.

Challenges of Unmanned Flight

The Air Force clearly understands the value of RPA operations and their importance to the future of air superiority. However, the RPA career field has problems of its own. Specifically, an arduous operational tempo, a challenge with addressing the mental and emotional stressors placed on the RPA operators, a sense of inequality from within the pilot career field that drives a wedge between “traditional” and RPA pilots, and even issues at Air Force strategic levels. Failing to address these issues could have a significant impact on the Air Force’s ability to make its 2035 vision a reality.

While the budgets and technology of RPA platforms have improved, the same cannot be said of the manning within the 18X community. In 2015, the Air Force anticipated a decrease in RPA operations to just 60 RPA flights per day as operations in Iraq and Afghanistan began to slow down.⁴⁸ However, an unexpected increase of activity from the ISIS terrorist organization caused the pendulum to swing the other way and RPA effects were in demand more than ever. The problem was that the Air Force did not have the required manning to support the increased demand. In January of 2015, the Air Force reported it only had 85 percent of the RPA pilots it needed and demand for drone missions has only been increasing.⁴⁹ The only way the Air Force

could meet the mission demand was to have RPA operators work more frequently and for longer shifts. This created a “brutal, 24 hours a day, 365 days a year” operational tempo.⁵⁰ Secretary of the Air Force, Deborah Lee James, and Air Force Chief of Staff, Gen. Mark Welsh III, voiced concern about the significant drone pilot shortage and an inability to sustain the operational tempo in January of 2015. In reference to the unrelenting pace of operations, Secretary James stated that RPA pilots log four times as many flight hours when compared to manned aircraft pilots, “ranging from 900 to 1,100 flight hours per year.”⁵¹ Beyond being overworked, recent studies have also shown that RPA attack pilots are facing other challenges, which may have not been anticipated by the Air Force since these pilots are not physically in the battlefield.

Over the past several years there have been growing reports of increased stress on RPA pilots and concerns over what that may mean to the pilots’ mental health. Wayne Chappelle, chief of aerospace psychology at the Air Force School of Aerospace Medicine at Wright-Patterson Air Force Base in Ohio, co-authored a medical report regarding post-traumatic stress disorder (PTSD) amongst Air Force RPA operators. Chappelle surveyed a total of 1,084 male and female RPA pilots across all ranks within the Air Force to identify how many were showing symptoms of PTSD and to what degree. The survey concluded that approximately 47 percent of RPA operators demonstrated some level of PTSD symptoms. While extreme cases of PTSD symptoms were small (less than 2 percent), the report surmised that PTSD symptoms among RPA operators in this study are significantly higher than the rates discovered in 2013.⁵²

While there are a myriad of articles and blogs to claim why PTSD is increasing amongst RPA operators, there are two factors that seem to be very common. The first is the fact that there is a loss of connection with others, partially due to the amount of hours the RPA operators work and partially because of the classification of the operations. This isolation “makes it difficult to

sustain a normal, routine home life.”⁵³ In 2013 Brandon Bryant, a former RPA operator, was interviewed and spoke to the mental and emotional challenges of RPA operations. Bryant recalls that one night after a particularly traumatic shift, he “finished the night numb.” After his target was eliminated he simply went home. There was no one to talk to about the night’s events nor anyone to help facilitate mentally and emotionally decompressing from the mission. This operational environment increases the likelihood that PTSD symptoms may develop, and also what the medical community refers to as “moral injury,” where “witnessing or being exposed to acts that violate an individual’s conception of right and wrong” incurs psychological damage.⁵⁴ The second factor influencing the presence of PTSD amongst RPA operators is the fact that they have a more intimate picture of the battlefield and their targets when compared to a pilot of a manned aircraft. In operations such as the one that targeted Emwazi, the RPA operators will survey their target for hours before the engagement, through the deployment of munitions, and after the mission to assess the damage, where operators can see in vivid detail what they have destroyed. Manned fighter aircraft more than often fly thousands of feet above their target, drop their ordnance, and then return to base. Advanced sensors and guided munitions have enable the pilot to complete their mission beyond the visual range of the target they strike. As a result, they the manned-aircraft pilot never actually see their target or the effects of their munition. RPA operators, clearly see the results of mission – good or bad, traumatic or not.⁵⁵ So, while RPA operators may not physically be in the battlefield, they are exposed to a higher level of detail that can contribute to the development of PTSD symptoms such as moral injuries.

The final issue this paper will address is the inequality between RPA and manned aircraft pilots. The inequality is both perceived by RPA operators and proven through school and promotion and selection rates. In 2015, Capt Michael Byrnes surveyed 114 RPA pilots to assess

their perceptions about the 18X career field when compared to traditional pilots flying manned aircraft. Many RPA pilots agreed that they were treated as “second class citizens” when compared to fighter pilots. RPA pilots indicated that comments on Officer Performance Reports (OPR) such as “#1/28 RPA Majors” would be written, leaving the top stratification OPR bullets for the reports of manned aircraft pilots. When asked, close to 30 percent of RPA pilots interviewed would not accept an assignment to Holloman AFB, which hosted both RPA and F-22 Raptor flight operations because of the perceived inequalities in the way the two categories of pilot are valued (Figure 3.1).⁵⁶ While perception may not always be reality, there is additional data to suggest that the inequalities between 18X pilot and manned aircraft pilots are very real.

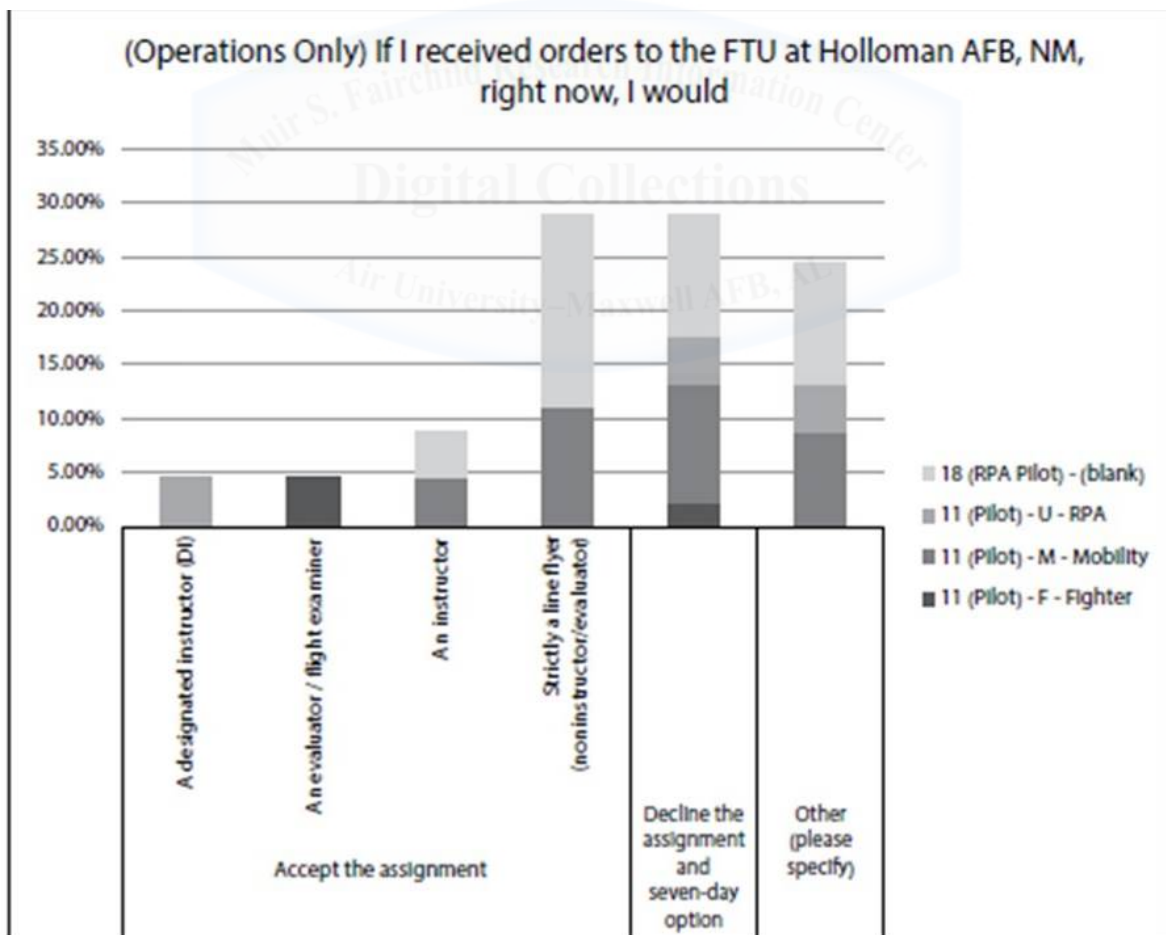


Figure 3.1: RPA Pilot Survey Summary (U.S. Air Force)

Selection for professional military education (PME) is one indicator that proves the inequalities between RPA and manned aircraft pilots. Air Force Colonel William Tart noted that “RPA pilots received less in-residence Squadron Officer School (SOS) slots by percentage than other specialty codes” in the Air Force. Naturally, an officer’s chances of promotion dwindle when they are not afforded the opportunity to attend and excel at PME courses, as completion of these courses is a significant discriminating factor. A filing in response to the National Defense Authorization Act of FY2013 reported that RPA operator promotions had been on a downward trend over the past five years, specifically, in the rank of Major, which is a critical milestone for any officer. If an officer does not get promoted to Major, then they will not be retained by the Air Force. Percentages in promotion from Captain to Major went from “96 percent to 78 percent, compared to a consistent range of 96 and 91 percent for their peers” between 2008 and 2013.⁵⁷ In April of 2014, the Government Accountability Office (GAO) released a report that also showed a discrepancy amongst RPA and manned-aircraft pilots. After reviewing promotion trends from 2006 through 2012, the GAO noted that RPA operators had the lowest promotion rates amongst pilots in 21 of 24 boards and were the lowest promoted AFSC in the Air Force on 9 of 24 promotion boards.⁵⁸ This data seems to support the notion, that in this case, perceptions are indeed a reality.

Beyond the mental health and equality issues, the RPA community has also been fraught with issues from an Air Force decisional level. Specifically, the GAO report noted that the Air Force’s crew-to-aircraft ratio was too low to support operations. Even the Air Force “understands that low crew ratios diminish combat capability and cause flight safety to suffer.”⁵⁹ The GAO report also noted that there was no clear recruiting and retention strategy that could result in the Air Force’s continuing manning shortfalls of RPA operators. Finally, the Air Force

had not implemented any direct feedback processes to obtain data and concerns directly from the RPA operator force.

Justifying an 18X Transformation

While the Air Force continues to highlight the importance of RPA operations from a budgetary and strategic perspective, it may not have the personnel needed to operate the RPA aircraft of its fleet due to the manning crisis. Data from the past several years continues to indicate that RPA operators are leaving faster than the Air Force can train their replacements and simply offering more money to RPA pilots may not end this trend. In addition, the manned fighter community is flying fewer hours due to budget cuts and its own manning crisis. As a result, it can be assumed the operational demand on RPA operations will only continue to grow.

Three recommendations are provided to help the Air Force successfully sustain the demands of today and meet the ones of tomorrow. The recommendations are not “stand alone” in their nature. The Air Force should pursue a blended solution of some, or all to help improve the 18X career field. However, the recommendations are presented in order of what the author feels would be most feasible – from easiest to most difficult. Since the crisis facing the 18X career field is current and ongoing, taking action sooner than later could help remedy the problem.

The first recommendation is to highlight the 18X career field at a national level to help combat negative press about RPAs, improve morale amongst the officers, and spark more interest about the career field to help with the recruitment of potential 18X officers. Next, this paper suggests that Air Force review actual flight training for candidates entering the 18X training pipeline to reduce the cost and schedule of training in order to develop more 18X officer

per year. The final recommendation is to rename the 18X career field from “pilot” to “operator.” While this final solution has numerous secondary and tertiary effects, it would align the career field name with the duties and roles of the 18X officer.

Recommendation: Embrace the 18X Culture—Highlight the Career Field in Air Force Media

While official Air Force publications speak to how important RPAs are to the future of airpower, there is very little mentioned in non-strategic documents. The Air Force is facing a manning issue within the 18X career field and should take the initial step of advertising RPA pilots to the world in order to highlight its importance. Essentially should create a “sales pitch” for that career field. This will not only spark interest from possible Air Force officer candidates, but it would also send a positive message to those in the 18X career field, since their job would be highlighted at a national level. As an example, iSpot TV, which is a website that tracks metrics for television commercials, shows that the Air Force “I knew One Day” commercial aired as recently as June 11th, 2016.⁶⁰ The commercial is essentially a montage of various ranks and career fields with a voice track of members stating they knew one day they would achieve greatness and the Air Force is their vehicle for said aspiration. The commercial does not mention or highlight RPA operations or its officers. In another example, the Air Force website video section highlights the MQ-9 Reaper Sensor Operator, Weapons Technician and Crew Chief, but there are no videos that highlight the 18X officer that operates the RPA.⁶¹

The media inconsistency given to the 18X officers may create mixed messages. On one hand, the Air Force writes to the importance of RPAs in its most recent Operating Concept and to the importance of a family of systems in its Air Superiority 2030 Flight Plan, but the messages that are seen by the world completely ignore the 18X career field. The Air Force should both

“say” and “show” to the world that RPA operations are a critical element of today and tomorrow’s Air Force. This will not only reinforce written messages, but also inform the world about the career field, possibly helping with the recruitment of 18X candidates. This approach could also help increase morale with the current 18X community. If an 18X officer sees their career field highlighted on national television it sends a message their role in the Air Force is important. Through the development of public media, the Air Force could show the world the positive benefits of RPA operations, which could significantly increase morale amongst the RPA community and possibly garner interest from possible recruits in the 18X career field.

Another benefit to praising the 18X career field in public is that it could help counter the massive amount of negative press Air Force RPA operations receives from both our adversaries and critics within our borders. In an article titled, “Remotely Piloted Aircraft and War in the Public Relations Domain,” Captain Joseph Chapa notes that Al Qaeda uses our RPA strikes to paint America as a nation and culture that does not care about collateral damage and loss of civilian life, even though RPA strikes “avoid civilian casualties about 86 percent of the time.”⁶² Additionally, after RPA strikes, some foreign governments will inflate the casualty rates. These rates are collected by US media outlets and are presented as “truth” to American and global citizens. While inflated, the media reports cause outrage and frustration throughout the globe. As an example, a group of people recently held a demonstration at Ramstein Air Base in Germany to protest RPA operations in June of 2016. After it was reported the base is used to support RPA operations, approximately three to four thousand people formed and chanted “Stop Ramstein – No Drone War.”⁶³

The Air Force has recently used national media to showcase operations and mission areas critical to our national defense. The popular television news show, 60 Minutes aired a segment

entitled “The Battle Above,” which focused on the Air Force’s space mission and its importance to national security.⁶⁴ If the Air Force could take a similar approach, use experienced civilian production companies, and focus on RPA operations and the people that make up the mission, it could help “humanize” the career field, instead of focusing on the technological advancements of RPAs. Examples of how RPA operations has ensured the safety of the pilot, our armed forces members on the ground and eliminated threats to US and allied nations can shift a negative perception from the media into a positive one for US and Allied citizens. Another angle to use would be to show how much care and consideration goes into any RPA strike to reduce collateral damage and protect the lives of any innocent bystanders. Using this approach would help counter any terrorist group’s message that “America Does Not Care” as noted by Captain Chapa. In addition to changing the opinion of individuals outside of the armed forces, this would also help to improve morale within the career field by painting everyone associated with RPAs in a positive light. While a professional media campaign can cost a considerable amount of money, it would help shift the negative opinion of RPA strikes across our nation and possible the world.

Recommendation: Modify Training Standards for 18X Candidates

Another option to transform the 18X career field relates to how 18X candidates are trained. This could help balance the ratio of RPA officers that separate from the Air Force each year versus the amount of RPA candidates produced each year. Under the current training pipeline, the Air Force spends anywhere from nine to twelve months training new RPA officer candidates after they earn their respective commission as an officer. During the first three blocks of specialized training (Figure 4.1), all 18X candidates cover the basics of piloting, including instrument qualification, check ride, and 49 hours in a T-6 simulator.⁶⁵

Currently, all pilot, combat systems officer and RPA officer candidates start their training at Doss Aviation in Pueblo, Colorado, which houses the 1st Flight Training Squadron for the Air Force. As a part of their initial flight screening, 18X candidates must successfully pass a flying class II physical and successfully complete a total of 39.3 hours of flight time across 27 sorties (six of those hours consist of solo flight). In addition to the required flight hours/sorties, there are also requirements for briefings/de-briefings and tasks such as pre-flight aircraft checks before takeoff.⁶⁶ Therefore, it can be argued that some of the time and tasks taught to 18X candidates may never be applied when they enter their career field.

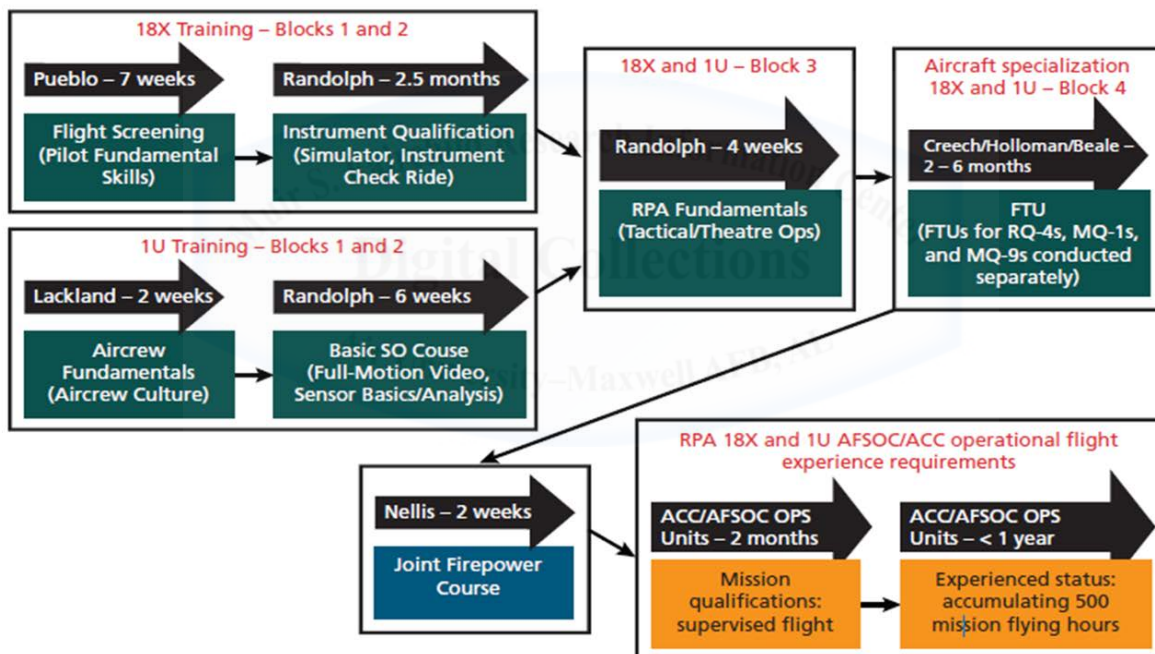


Figure 4.1: 18X Training Pipeline (U.S. Air Force)

As a result, the Air Force should consider whether or not flight time in a cockpit is a true requirement for an officer in the 18X career field. A possible way to do this would be to move the initial training requirements to simulators, so students would be able to practice operating their aircraft from a computer terminal, which is what they do when they finish their training and

enter the operational Air Force. Technological advancements relating to aircraft simulators has greatly improved to provide an enhanced layer of realism. As an example, Lockheed Martin's F-35 flight simulator uses the actual F-35 software to conduct student training in "high-fidelity, full mission" simulation with a "360-degree field of view."⁶⁷ The pilot trains on the exact system they will use when they enter the cockpit. Naturally, transitioning RPA pilots to a simulator only training approach would be more feasible if the Air Force also change the name in the 18X AFSC from "pilot" to "operator," but it is not necessarily a requirement. Transitioning to simulator-based training would also enable students to progress through a training pipeline with fewer schedule interruptions. External events such as aircraft maintenance issues, availability rates, and inclement weather would not cancel simulator training since an aircraft is never actually flown. Moving to a simulator based training would enable the Air Force to possibly shorten the time it takes an 18X candidate to progress through the first blocks of training, reduce costs of training and perhaps most importantly certify more 18X officers on an annual basis, giving some relief to the ration of officers leaving and entering the operational Air Force.

Should the Air Force be unable to reduce the requirement for cockpit flight time, it should also consider increasing the amount of flight time to increase morale of 18X candidate, which has also been noted as a frequent problem of those in the 18X career field. As noted earlier in this thesis, an 18X candidate currently logs a total of 39.3 flight hours. The FAA requirement for a private pilot's license is currently 40 hours of total flight time with 10 hours of solo flight time.⁶⁸ While this would increase training time for 18X candidates, the difference is minimal and an 18X graduate would meet all FAA requirements for their private pilot license, which could very well increase morale.

Recommendation: Rename the 18X Career Field

There is no doubt that RPA operations will continue to be an important factor for the future of air superiority. However, as stated already, in order to use the tools available to it, the Air Force must find a way to train and retain a qualified pool of RPA operators to sustain and increase the amount of pilots in the career field. The 18X career field of Remotely Piloted Aircraft Pilot is misleading in its title because in reality, 18X pilots are not really pilots in the traditional sense at all. According to the Cambridge Dictionary a pilot is a “person who flies an aircraft, or someone who directs a ship safely through an area of water.”⁶⁹ It can be argued that an officer sitting at the control terminal of an MQ-9 Reaper is not flying an aircraft, but operating and controlling a system to keep an RPA in flight. While some may consider the difference semantic in nature, the word pilot does build a certain level of expectation to an individual.

When an individual is interested on pursuing the career as a military pilot, specifically within the Air Force, they more than likely do not envision flying from a desk. The Air Force’s career description of a pilot starts with “Commanding the Skies,” not “Commanding the Skies from the Comfort of An Office Chair.” The definition goes on to state that “Air Force Pilots push each aircraft’s limits with complete control” and “deploy around the world” to complete their missions.⁷⁰ In addition, in the “Aircraft and Flight” sections of the official Air Force website career section, the 18X (or RPAs) is not listed. The website lists 32 career fields, three of them officer in nature: Air Battle Manager, Aircraft Maintenance Officer and Pilot and ironically, one of the enlisted career fields highlighted is Remotely Piloted Aircraft Maintenance.⁷¹ So, while the title of 18X implies the officer is a pilot, the official Air Force website does not. As a result, the expectations and perceptions of a pilot according to the Air Force, does not really pertain to RPA operators.

Establishing clear and correct career field expectations and perceptions is critical to job satisfaction. The Motivation, Abilities, Role Perception and Situational Factors (MARS) Model of Individual Behavior “is a model that seeks to elaborate individual behavior as a result of internal and external factors or influences combined together.” The model speaks to four key factors such as motivation, ability, situational factors and role perceptions. Role perception is an individual’s belief as to what the job will entail and where he or she may fit in the grander scheme of operations.⁷² Taking the AF advertised definitions and MARS into consideration, referring to RPA operators as pilots could very well foster a condition where individual perceptions are not met and as a result a decrease in overall job satisfaction.

Job satisfaction is another element that may drive whether or not a skilled professional remains in a career field. According to a paper published by Pennsylvania State University, “people tend to evaluate their work experiences based on feelings of satisfaction or dissatisfaction regarding their job, as well as the organization in which they work.”⁷³ Elements of job satisfaction involve much more than salary and compensations. Job satisfaction also involves elements such as working conditions (i.e. work space, hours of work), professional advancement, good leadership practices, feedback and support (Figure 4.2).

Considering the Air Force’s definition of a pilot, the importance of career field expectations and some of the elements of job satisfaction, it can be argued that a contributing factor to the problems faced by the 18X community is that these “pilots” are not pilots at all. Placing them in a category with manned-aircraft pilots is only similar in results (i.e. an aircraft dropping a bomb on a target), but it doesn’t reflect what the RPA operator does, which is closer

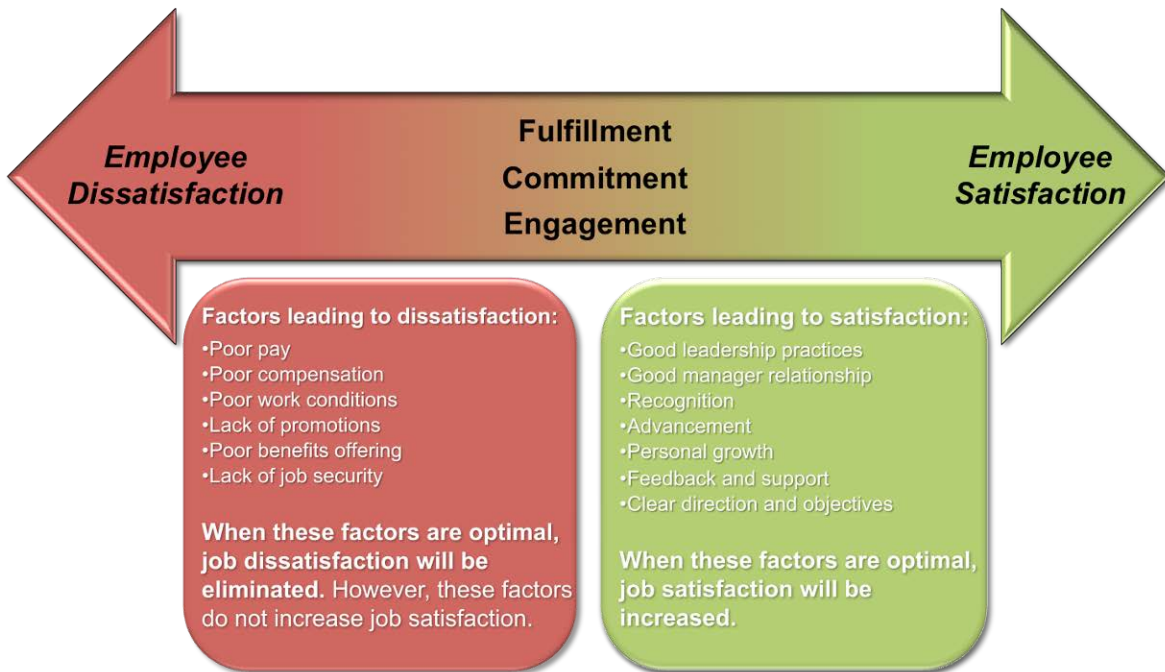


Figure 4.2: Elements of Job Satisfaction (Reproduced with permission from Author by Justin Field)

to using a computer or cyber system to make decisions based on information that system provides. While RPA operators have some flight training, their AFSC could be renamed to Remote Piloted Aircraft Operator versus pilot to more accurately reflect the tasks associated with an officer in the 18X career field and increase job satisfaction resulting in RPA pilot retention.

Conclusion

In addition to the recommendations in this paper, it is also worth noting Dr. Wayne Chappelle's suggestion to ensure RPA operators, both enlisted and officer alike, go through routine screening to care for the member and learn more about the psychological effects of RPA operations. Dr. Chappelle makes the point that literature and data on PTSD associated with RPA operations is scarce, so it is not clear if mental health issues are the result of engaging a target or other operational factors such as long work hours or the work/life balance. In the opinion of this author, Dr. Chappelle's recommendation of assigning "mental health providers with proper security clearances who are directly embedded" within RPA units should be acted upon by the Air Force.⁷⁴ This would firstly and most importantly, provide support to the RPA operators and allow the Air Force to learn more about mental health issues associated with the career fields. This recommendation could also help improved morale within RPA units. Support would be provided to the operators to help them mentally and emotionally process what they witnessed during a RPA mission. This outlet would allow the RPA operators to express their feelings and thoughts, help them balance their military life and civilian life and in turn improve morale of the operator. One could argue that the an appointment with a mental health provider be required after any RPA mission that resulted in the loss of life, regardless of whether the life or lives were adversarial or collateral damage in nature.

While the Air Force has taken some positive steps recently relating to the RPA career field, such as eligibility for incentive pay of up to \$125,000 across five years, there are other ways to help the career field and the Air Force beyond fiscal bonuses. In addition, by the time the 18X officer reaches the eligibility requirement for the bonus of six years, they may have already made their decision to leave the Air Force – so it could be a case of too little, too late.⁷⁵

Instead, the USAF take action to highlight the career field at national media levels, modify the training pipeline and/or rename the career field to more accurately align the duties with job title of 18X officers. These solutions can help properly categorize an 18X officer's duties, train more 18X candidate and place them in the operational Air Force more efficiently and increase morale within the career field. As a result, by the time an 18X officer is eligible for their career field incentive pay/bonus, they may be more enticed to remain in the Air Force. This would help retain a pool of skilled professionals as RPA demands grow and lay the building blocks to create a more established pool of 18X officers as senior leaders to serve as career field mentors and help the 18X career field from a strategic perspective as its importance grows to achieve the future of air superiority.



Notes

¹ Yaron Steinbuch and Jamie Schram, “It Looks Like We Smoked This Son of a Bitch,” The New York Post, 12 November 2015, <http://nypost.com/2015/11/12/us-airstrike-targets-jihadi-john/> (New York, NY).

² Deborah Lee James and CSAF Mark A. Welsh III, Air Force Future Operating Concept: A View of the Air Force in 2035 (Washington, D.C., 2015), 30.

³ Joint Publication 3-0, Joint Operations, 11 August 2011, xvii.

⁴ Department of the Air Force, “Fiscal Year (FY) 2016 Budget Estimates”, Feb 2015

⁵ Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, “Program Acquisition Cost by Weapon System,” March 2014, United States Department of Defense Fiscal Year 2015 Budget Request, Washington, D.C.

⁶ Lockheed Martin, “The F-35 Helmet: Unprecedented Situational Awareness,” Lockheed Martin Corporation, Bethesda, MD, 2016, <https://www.f35.com/about/capabilities/helmet>.

⁷ Phillip Swarts, “F-35 helmet costs \$400,000 — 4 times that of predecessor,” Air Force Times, 26 October 2015, <http://www.airforcetimes.com/story/military/2015/10/26/f-35-helmet-costs-400000-4-times-predecessor/73826180/>

⁸ David Axe, “Pentagon’s big budget F-35 fighter ‘can’t turn, can’t climb, can’t run’,” Reuters, 14 Jul 2014, <http://blogs.reuters.com/great-debate/2014/07/14/pentagons-big-budget-f-35-fighter-cant-turn-cant-climb-cant-run/>

⁹ United States Air Force, MQ-9 Reaper, Air Combat Command Public Affairs Office, September 23, 2015,

<http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104470/mq-9-reaper.aspx> (Accessed on 03 June 2016). (Washington, D.C.)

¹⁰ Ashley Boyle, “The US and Its UAVs: A Cost-Benefit Analysis,” American Security Project, July 24, 2012, <http://www.americansecurityproject.org/the-us-and-its-uavs-a-cost-benefit-analysis/> (Accessed on 2 June 2016). (Langley, VA).

¹¹ Assumes flight operations for 24 hours coverage with a manned fighter would require approximately four sorties with one manned aircraft per sortie. AnUCAV has the potential to operate for 24 hours, reducing the number of aircraft required by three.

¹² Graham Warwick, “Aurora Claims Endurance Record for Orion UAS,” Aviation Week Network, 22 Jan 2015, <http://aviationweek.com/defense/aurora-claims-endurance-record-orion-uas> (Accessed on 09 Jan 2016). (Arlington, VA)

¹³ Aaron Church, “RPA Ramp Up,” Air Force Magazine 94, no. 6 (June 2011): 58, <http://www.airforcemag.com/MagazineArchive/Documents/2011/June%202011/0611RPA.pdf>.

¹⁴ Micah Zenko, “Obama’s Embrace of Drone Strikes Will Be a Lasting Legacy,” The New York Times, January 12, 2016, <http://www.nytimes.com/roomfordebate/2016/01/12/reflecting-on-obamas-presidency/obamas-embrace-of-drone-strikes-will-be-a-lasting-legacy> (Accessed on 06 June 2016). (New York, N.Y.).

¹⁵ Phillip Swarts, “Wanted: A Few Good Pilots,” Air Force Times, March 21, 2016, <http://www.airforcetimes.com/story/military/2016/03/21/career-rpa-pilot-job-drone/81883080/> (Accessed on 1 June 2016). (Washington, D.C.).

¹⁶ Secretary of the Air Force Deborah Lee James and Chief of Staff of the Air Force General Welsh III, 15 January 2015, State of the Air Force Press Briefing <http://www.defense.gov/News/News-Transcripts/Transcript-View/Article/606995>

¹⁷ United States Government Accountability Office, “Actions Needed to Strengthen Management of Unmanned Aerial System Pilots,” 14.

Notes

¹⁸ Brendan McGarry, "Fewer Than 10 Drone Pilots to Receive \$1,500 Monthly Bonus This Year," Military.com, February 13 2015, <http://www.military.com/daily-news/2015/02/13/fewer-than-10-pilots-to-receive-monthly-bonus-incentive.html>

¹⁹ Amanda Terkel, "Air Force Worried No One Wants to be a Drone Pilot," Huffington Post, 16 January 2015, http://www.huffingtonpost.com/2015/01/16/drone-pilots_n_6488600.html. (New York, NY).

²⁰ Capt Michael W. Byrnes, "Dark Horizon: Airpower Revolution on a Razor's Edge," Air and Space Power Journal, Volume 29, Issue 6. 39.

²¹ C.N. Trueman, "Aircraft and World War One," The History Learning Site, March 3, 2016, <http://www.historylearningsite.co.uk/world-war-one/aerial-warfare-and-world-war-one/aircraft-and-world-war-one/> (Accessed on 14 April 2016).

²² Matthew Knight, "Roland Garros: France's Forgotten WWI Hero," The Cable News Network, May 30, 2014, <http://edition.cnn.com/2014/05/29/sport/roland-garros-war-hero-french-open/> (Accessed on 14 April 2016). (Atlanta, GA).

²³ Stephen Sherman, "Billy Mitchell: Early Airpower Advocate," Ace Pilots, April 16, 2012, http://acepilots.com/wwi/us_mitchell.html (Accessed on 10 March 2016).

²⁴ C.V. Glines, "William 'Billy' Mitchell: An Air Power Visionary," History Network, June 12, 2006, <http://www.historynet.com/william-billy-mitchell-an-air-power-visionary.htm> (Accessed on 01 May 2016). (Tysons, VA).

²⁵ Major Michael J. Taschner, "Examples of Airmindedness from America's First Operational Air Campaign: The St. Mihiel Offensive, 1918," Air University: Air Command and Staff College, Maxwell AFB, AL, March 1997. 4.

26. Ibid, 7.

²⁷ United Air Force Historical Research Agency, "The Birth of the United States Air Force," United States Air Force, January 9, 2008, <http://www.afhra.af.mil/factsheets/factsheet.asp?id=10944> (Accessed on 29 April 2016). (Washington, D.C.).

²⁸ Department of Defense, Annual Aviation Inventory and Funding Plan Fiscal Years (FY) 2017-2046, Office of the Secretary of Defense, March 2016, <http://ec.militarytimes.com/static/pdfs/2016-Annual-Aviation-Report.pdf> (Accessed on 20 May 2016). (Washington, D.C.).

²⁹ Lara Seligman, "US Air Force Can't Afford Its Fighter Jets Past 2021," Defense News, May 23, 2016, <http://www.defensenews.com/story/defense/air-space/air-force/2016/05/23/us-air-force-cant-afford-its-fighter-jets-past-2021/84789148/> (Accessed on 26 May 2016). (Washington, D.C.).

³⁰ Jeremiah Gertler, "Air Force F-22 Fighter Program," Congressional Research Service Report for Congress, Washington, D.C., July 11, 2013. <https://www.fas.org/sgp/crs/weapons/RL31673.pdf> (Accessed on 10 May 2016). 9.

³¹ Average of F-16 A/B (\$14.6 million each) and F-16 C/D (\$18.8 each)

³² United States Air Force, F-16 Fighting Falcon, Air Combat Command Public Affairs Office, September 23, 2015, <http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104505/f-16-fighting-falcon.aspx> (Accessed on 10 May 2016). (Langley, VA).

³³ This is assuming a straight line inflation rate of 2.15 percent between 1998 and 2016.

³⁴ Arena, Younossi, Brancato, Blickstein and Grammich, "A Macroscopic View of the Trends in US Military Aircraft Costs Over the Past Several Decades," The RAND Corporation, Santa

Notes

Monica, California, 2008.

http://www.rand.org/content/dam/rand/pubs/monographs/2008/RAND_MG696.pdf 13.

³⁵ David Axe, "The U.S. Air Force May Have Just Built Its Last Fighter Aircraft," *The Daily Beast*, June 5, 2016, <http://www.thedailybeast.com/articles/2016/06/06/the-u-s-air-force-may-have-just-built-its-last-fighter-jet.html> (Accessed on 8 June 2016). (New York, NY).

³⁶ United States Air Force, *Air Superiority 2030 Flight Plan*, Air Force Enterprise Capability Collaboration Team, May 26, 2015, Washington, D.C. 4.

³⁷ Tony Carr, "Corporate Paralysis Strikes Air Force as Fighter Pilots Bail Out," *John Q. Public*, September 12, 2015, <http://www.jqpublicblog.com/corporate-paralysis-strikes-air-force-as-fighter-pilots-bail-out/> (Accessed on 29 April 2016). (Washington, D.C.)

³⁸ Tyler Rogoway, "The USAF's Pilot Shortage Has Reached Disastrous Levels," *The Drive*, June 2, 2016, <http://www.thedrive.com/the-war-zone/3776/the-usafs-pilot-shortage-has-reached-disastrous-levels> (Accessed on 04 June 2016).

³⁹ Lara Seligman, "US Air Force Faces 500 Fighter Pilot Shortfall," *Defense News*, March 11, 2016, <http://www.defensenews.com/story/defense/air-space/2016/03/09/us-air-force-facing-500-fighter-pilot-shortfall/81530748/> (Accessed on 10 April 2016). (Washington, D.C.).

⁴⁰ Brian Everstine, "Airlines Increase Pilot Hiring, Threaten AF Retention," *Air Force Times*, 20 April 2015, <http://www.airforcetimes.com/story/military/2015/04/20/airlines-increase-pilot-hiring-threaten-af-retention/25941529/> (Accessed on 15 March 2016). (Washington, D.C.).

⁴¹ Tony Carr, "Internal Email Shows Air Force Pilot Shortage at 'CRISIS' Level," *John Q. Public*, May 31, 2016, <http://www.jqpublicblog.com/internal-email-shows-air-force-pilot-shortage-crisis-level/> (Accessed on 03 June 2016). (Washington, D.C.)

⁴² Tyler Rogoway, "The USAF's Pilot Shortage Has Reached Disastrous Levels."

⁴³ Lee James and CSAF Mark A. Welsh III, *Air Force Future Operating Concept: A View of the Air Force in 2035* (Washington, D.C., 2015), 22, 34.

⁴⁴ Mary-Ann Russon, "Pentagon Increasing Drone Flights by 50% To Meet Demand for Air Strikes and Global Surveillance," *International Business Times*, August 17, 2015, <http://www.ibtimes.co.uk/pentagon-increasing-drone-flights-by-50-meet-demand-airstrikes-global-surveillance-1515796> (Accessed on 27 April 2016). (New York, NY).

⁴⁵ W.J. Jennigan, "Air Force proposes \$3-billion plan to vastly expand its drone program," *Los Angeles Times*, December 10, 2015, <http://www.latimes.com/world/middleeast/la-fg-drone-pilots-20151210-story.html> (Accessed on 27 April 2016). (Los Angeles, CA).

⁴⁶ Dan Gettinger, "Drone Spending in the Fiscal Year 2017 Defense Budget," *Center for the Study of the Drone*, Bard College, February 2016. (Annandale-on-Hudson, NY). 8.

⁴⁷ Patrick Tucker, "US Air Force to Ask for More Drones," *Defense One*, December 11, 2015, <http://www.defenseone.com/technology/2015/12/us-air-force-ask-more-drones/124424/> (Accessed on 27 April 2016). (Washington, D.C.).

⁴⁸ Edwin Mora, "NYT: Stressed Out Drone Pilots Forcing Air Force to Reduce Flights," *Breitbart Magazine*, June 19, 2015, <http://www.breitbart.com/national-security/2015/06/19/nyt-stressed-out-drone-pilots-forcing-air-force-to-reduce-flights/> (Accessed on 20 March 2016).

⁴⁹ Jeff Schogol, "Air Force Raises Monthly Incentive Pay for Drone Pilots," *Air Force Times*, January 16, 2015, <http://www.airforcetimes.com/story/military/2015/01/15/more-pay-for-drone-pilots/21829659/> (Accessed on 19 April 2016). (Washington, D.C.).

⁵⁰ Christopher Drew and Dave Phillips, "As Stress Drives Off Drone Operators, Air Force Must Cut Flights," *New York Times*, June 16, 2015, <http://www.nytimes.com/2015/06/17/us/as-stress->

Notes

drives-off-drone-operators-air-force-must-cut-flights.html?_r=0 (Accessed on 01 June 2016). (New York, NY).

⁵¹ Department of Defense, State of the Air Force Press Briefing by Secretary James and General Welsh in the Pentagon Briefing Room,” Press Operations Transcript, January 15, 2015, <http://www.defense.gov/News/News-Transcripts/Transcript-View/Article/606995> (Accessed on 27 May 2016). (Washington, D.C.).

⁵² Chappelle, Goodman, Reardon and Thompson, “An Analysis of Post-Traumatic Stress Symptoms in United States Air Force Drone Operators,” University of Nebraska and US Department of Defense, *Journal of Anxiety Disorders* 28, 2014, Lincoln, Nebraska. 483.

⁵³ *Ibid*, 485.

⁵⁴ Dan Gettinger, “Burdens of War: PTSD and Drone Crews,” Center for the Study of the Drone, Bard College, New York, April 21, 2014, <http://dronecenter.bard.edu/burdens-war-crews-drone-aircraft/> (Accessed on 01 June 2016).

⁵⁵ Elisabeth Bumiller, “Air Force Drone Operators Report High Levels of Stress,” *New York Times*, December 18, 2011, http://www.nytimes.com/2011/12/19/world/asia/air-force-drone-operators-show-high-levels-of-stress.html?_r=0 (Accessed on 31 May 2016). (New York, NY).

⁵⁶ Capt Michael W. Byrnes, “Dark Horizon: Airpower Revolution on a Razor’s Edge,” *Air and Space Power Journal*, Volume 29, Issue 6. 39.

⁵⁷ Colonel Bradley T. Hoagland, “Manning the Next Unmanned Air Force: Developing RPA Pilots of the Future,” Center for 21st Century Security and Intelligence, Brookings Institute, August 2013, Washington, D.C. 13.

⁵⁸ Government Accountability Office, *Air Force: Actions Needed to Strengthen Management of Unmanned Aerial System Pilots*, Report to Congress, April 2014, Washington, D.C. 28.

⁵⁹ *Ibid*.

⁶⁰ iSpotTV, “US Air Force TV Spot: I Knew One Day,” <https://www.ispot.tv/ad/7C75/us-air-force-i-knew-one-day> (Accessed on 10 June 2016).

⁶¹ U.S Air Force, *Watch Videos*, Aircraft and Flight, <https://www.airforce.com/watch-videos> (Accessed on 10 June 2016). (Washington, D.C.).

⁶² Captain Joseph O. Chapa, “Remotely Piloted Aircraft and War in the Public Relations Doman,” *Air and Space Power Journal*, Air University Press, September-October 2014, Maxwell AFB, AL. 33.

⁶³ Caroline Copley, “Thousands Protest Against Drones at U.S. Air Force Base in Germany,” *Reuters*, June 12, 2016, <http://www.reuters.com/article/us-usa-drones-germany-idUSKCN0YX0FM> (Accessed on 15 June 2016).

⁶⁴ David Martin, “The Battle Above,” *60 Minutes*, CBS News Corporation, April 26, 2015, <http://www.cbsnews.com/news/rare-look-at-space-command-satellite-defense-60-minutes-2/> (Accessed on 14 June 2016). (New York, NY).

⁶⁵ Hardison, Mattock and Lytell, “Incentive Pay for Remotely Piloted Aircraft Career Fields,” *The Rand Corporation*, Project Air Force, Santa Monica, CA. 2012. 10-11.

⁶⁶ United States Air Force, *Remotely Piloted Aircraft (RPA) Pilot Initial Flight Training*, Air Education and Training Command/A3FP, Randolph AFB, TX, May 2016.

⁶⁷ Lockheed Martin, *F-35 Lightning II: Training, Support Equipment and Sustainment for Fifth Generation Aircraft*, Lockheed Martin Corporation, Washington, D.C., 2015. 3.

⁶⁸ Federal Aviation Administration, *Part 61 Certification: Pilots, Flight Instructors and Ground Instructors*, Code of Federal Regulations, Section 61.109; Subpart E—Private Pilots, Washington, D.C.

Notes

⁶⁹ Cambridge University Press, *Pilot*, Cambridge Dictionary, 2016, <http://dictionary.cambridge.org/us/dictionary/english/pilot> (Accessed on 09 June 2016). (Cambridge, England).

⁷⁰ United States Air Force, *Officer: Pilot*, Air Force Officer Career Field Descriptions, <https://www.airforce.com/careers/detail/pilot/> (Accessed on 09 June 2016). (Washington, D.C.).

⁷¹ United States Air Force, *What Areas Interest You?*, Aircraft and Flight, <https://www.airforce.com/careers/browse-careers> (Accessed on 09 June 2016). (Washington, D.C.)/

⁷² Tutorials Point, "MARS Model of Individual Behavior," Individual and Group Behavior Models, http://www.tutorialspoint.com/individual_and_group_behavior/mars_model_individual_behavior.htm (Accessed on 10 June 2016). (Hyderabad, India).

⁷³ Brian Francis Redmond, "Work Attitudes and Job Motivation," Pennsylvania State University, April 3, 2016, <https://wikispaces.psu.edu/display/PSYCH484/11.+Job+Satisfaction> (Accessed on 10 June 2016). (State College, PA).

⁷⁴ Chappelle, Goodman, Reardon and Thompson, "An Analysis of Post-Traumatic Stress Symptoms in United States Air Force Drone Operators," University of Nebraska and US Department of Defense, *Journal of Anxiety Disorders* 28, 2014, Lincoln, Nebraska. 486.

⁷⁵ Stephen Losley, "To Meet Anti-Terror Demand, Air Force Offers \$125K Bonuses to Keep Drone Pilots," *Air Force Times*, December 15, 2016, <http://www.airforcetimes.com/story/military/benefits/pay/2015/12/15/rpa-pilots-now-eligible-for-125k-retention-bonus/77370056/> (Accessed on 11 June 2016). (Washington, D.C.).

Bibliography

- Arena, Younossi, Brancato, Blickstein and Grammich. "A Macroscopic View of the Trends in US Military Aircraft Costs Over the Past Several Decades." *The RAND Corporation*, Santa Monica, California, 2008.
- Axe, David. "Pentagon's big budget F-35 fighter 'can't turn, can't climb, can't run.'" *Reuters*, 14 Jul 2014. <http://blogs.reuters.com/great-debate/2014/07/14/pentagons-big-budget-f-35-fighter-cant-turn-cant-climb-cant-run/>
- Axe, David. "The U.S. Air Force May Have Just Built Its Last Fighter Aircraft." *The Daily Beast*, June 5, 2016. <http://www.thedailybeast.com/articles/2016/06/06/the-u-s-air-force-may-have-just-built-its-last-fighter-jet.html>
- Boyle, Ashley. "The US and Its UAVs: A Cost-Benefit Analysis." *American Security Project*, July 24, 2012. <http://www.americansecurityproject.org/the-us-and-its-uavs-a-cost-benefit-analysis/>
- Bumiller, Elisabeth. "Air Force Drone Operators Report High Levels of Stress." *New York Times*, December 18, 2011. http://www.nytimes.com/2011/12/19/world/asia/air-force-drone-operators-show-high-levels-of-stress.html?_r=0
- Capt Byrnes, Michael W. "Dark Horizon: Airpower Revolution on a Razor's Edge." *Air and Space Power Journal*, Volume 29, Issue 6.
- Cambridge University Press. *Pilot*, Cambridge Dictionary, 2016. <http://dictionary.cambridge.org/us/dictionary/english/pilot>
- Carr, Tony. "Corporate Paralysis Strikes Air Force as Fighter Pilots Bail Out." *John Q. Public*, September 12, 2015. <http://www.jqpublicblog.com/corporate-paralysis-strikes-air-force-as-fighter-pilots-bail-out/>
- Carr, Tony. "Internal Email Shows Air Force Pilot Shortage at "CRISIS" Level." *John Q. Public*, May 31, 2016. <http://www.jqpublicblog.com/internal-email-shows-air-force-pilot-shortage-crisis-level/>
- Capt Chapa, Joseph O. "Remotely Piloted Aircraft and War in the Public Relations Doman." *Air and Space power Journal*, Air University Press, September-October 2014, Maxwell AFB, AL.
- Chappelle, Goodman, Reardon and Thompson. *An Analysis of Post-Traumatic Stress Symptoms in United States Air Force Drone Operators*. University of Nebraska and US Department of Defense, *Journal of Anxiety Disorders* 28, 2014, Lincoln, Nebraska.

- Church, Aaron. "RPA Ramp Up." *Air Force Magazine*. Issue 94, no. 6, June 2011. <http://www.airforcemag.com/MagazineArchive/Documents/2011/June%202011/0611RPA.pdf>
- Copley, Caroline. "Thousands Protest Against Drones at U.S. Air Force Base in Germany." Reuters, June 12, 2016. <http://www.reuters.com/article/us-usa-drones-germany-idUSKCN0YX0FM>
- Department of the Air Force. "Fiscal Year (FY) 2016 Budget Estimates." Feb 2015.
- Department of Defense, *Annual Aviation Inventory and Funding Plan Fiscal Years (FY) 2017-2046*. Office of the Secretary of Defense, March 2016. <http://ec.militarytimes.com/static/pdfs/2016-Annual-Aviation-Report.pdf>
- Department of Defense. "State of the Air Force Press Briefing by Secretary James and General Welsh in the Pentagon Briefing Room." Press Operations Transcript, January 15, 2015. <http://www.defense.gov/News/News-Transcripts/Transcript-View/Article/606995>
- Drew, Christopher and Phillips, Dave. "As Stress Drives Off Drone Operators, Air Force Must Cut Flights." *New York Times*, June 16, 2015. http://www.nytimes.com/2015/06/17/us/as-stress-drives-off-drone-operators-air-force-must-cut-flights.html?_r=0
- Everstine, Brian "Airlines Increase Pilot Hiring, Threaten AF Retention." *Air Force Times*, 20 April 2015. <http://www.airforcetimes.com/story/military/2015/04/20/airlines-increase-pilot-hiring-threaten-af-retention/25941529/>
- Federal Aviation Administration. *Part 61 Certification: Pilots, Flight Instructors and Ground Instructors*. Code of Federal Regulations.
- Gertler, Jeremiah "Air Force F-22 Fighter Program." *Congressional Research Service Report for Congress*, Washington, D.C., July 11, 2013.
- Gettinger, Dan. "Drone Spending in the Fiscal Year 2017 Defense Budget." *Center for the Study of the Drone*, Bard College, February 2016.
- Gettinger, Dan. "Burdens of War: PTSD and Drone Crews," *Center for the Study of the Drone*, Bard College, New York, April 21, 2014. <http://dronecenter.bard.edu/burdens-war-crews-drone-aircraft/>
- Glines, C.V. "William 'Billy' Mitchell: An Air Power Visionary," *History Network*, June 12, 2006. <http://www.historynet.com/william-billy-mitchell-an-air-power-visionary.htm>
- Government Accountability Office, *Air Force: Actions Needed to Strengthen Management of Unmanned Aerial System Pilots*, Report to Congress, April 2014.

Hardison, Mattock and Lytell, "Incentive Pay for Remotely Piloted Aircraft Career Fields," *The Rand Corporation*, Project Air Force, Santa Monica, CA. 2012.

Colonel Hoagland, Bradley T. "Manning the Next Unmanned Air Force: Developing RPA Pilots of the Future." *Brooking Institute, Center for 21st Century Security and Intelligence* August 2013.

iSpotTV. "US Air Force TV Spot: I Knew One Day." <https://www.ispot.tv/ad/7C75/us-air-force-i-knew-one-day>

James, Deborah Lee and CSAF Welsh, Mark A III. *Air Force Future Operating Concept: A View of the Air Force in 2035*. Washington, D.C., 2015.

James, Deborah Lee and CSAF Welsh, Mark A III. *State of the Air Force Press Briefing*. 15 January 2015. <http://www.defense.gov/News/News-Transcripts/Transcript-View/Article/606995>

James, Deborah Lee and CSAF Welsh, Mark A III. *Air Force Future Operating Concept: A View of the Air Force in 2035*. Washington, D.C., 2015.

Jennigan, W.J. "Air Force proposes \$3-billion plan to vastly expand its drone program." *Los Angeles Times*, December 10, 2015. <http://www.latimes.com/world/middleeast/la-fg-drone-pilots-20151210-story.html>

Joint Publication 3-0, Joint Operations. 11 August 2011.

Knight, Matthew "Roland Garros: France's Forgotten WWI Hero." *The Cable News Network*, May 30, 2014. <http://edition.cnn.com/2014/05/29/sport/roland-garros-war-hero-french-open/>

Lockheed Martin. "The F-35 Helmet: Unprecedented Situational Awareness," *Lockheed Martin Corporation*, Bethesda, MD, 2016, <https://www.f35.com/about/capabilities/helmet>

Lockheed Martin. "F-35 Lightning II: Training, Support Equipment and Sustainment for Fifth Generation Aircraft." *Lockheed Martin Corporation*, Washington, D.C., 2015.

Losley, Stephen. "To Meet Anti-Terror Demand, Air Force Offers \$125K Bonuses to Keep Drone Pilots," *Air Force Times*, December 15, 2016. <http://www.airforcetimes.com/story/military/benefits/pay/2015/12/15/rpa-pilots-now-eligible-for-125k-retention-bonus/77370056/>

Martin, David. "60 Minutes: The Battle Above." *CBS News Corporation*, April 26, 2015. <http://www.cbsnews.com/news/rare-look-at-space-command-satellite-defense-60-minutes-2/>

- McGarry, Brendan "Fewer Than 10 Drone Pilots to Receive \$1,500 Monthly Bonus This Year." *Military.com*, February 13 2015. <http://www.military.com/daily-news/2015/02/13/fewer-than-10-pilots-to-receive-monthly-bonus-incentive.html>
- Mora, Edwin "NYT: Stressed Out Drone Pilots Forcing Air Force to Reduce Flights," *Breitbart Magazine*, June 19, 2015, <http://www.breitbart.com/national-security/2015/06/19/nyt-stressed-out-drone-pilots-forcing-air-force-to-reduce-flights/>
- Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, *Program Acquisition Cost by Weapon System.*" United States Department of Defense Fiscal Year 2015 Budget Request, March 2014. Washington, D.C.
- Redmond, Brian Francis "Work Attitudes and Job Motivation." *Pennsylvania State University*, April 3, 2016. <https://wikispaces.psu.edu/display/PSYCH484/11.+Job+Satisfaction>
- Rogoway, Tyler. "The USAF's Pilot Shortage Has Reached Disastrous Levels." *The Drive*, June 2, 2016. <http://www.thedrive.com/the-war-zone/3776/the-usafs-pilot-shortage-has-reached-disastrous-levels>
- Russon, Mary-Ann. "Pentagon Increasing Drone Flights by 50% To Meet Demand for Air Strikes and Global Surveillance." *International Business Times*, August 17, 2015. <http://www.ibtimes.co.uk/pentagon-increasing-drone-flights-by-50-meet-demand-airstrikes-global-surveillance-1515796>
- Schogol, Jeff. "Air Force Raises Monthly Incentive Pay for Drone Pilots." *Air Force Times*, January 16, 2015. <http://www.airforcetimes.com/story/military/2015/01/15/more-pay-for-drone-pilots/21829659/>
- Seligman, Lara. "US Air Force Can't Afford Its Fighter Jets Past 2021." *Defense News*, May 23, 2016, <http://www.defensenews.com/story/defense/air-space/air-force/2016/05/23/us-air-force-cant-afford-its-fighter-jets-past-2021/84789148/>
- Seligman, Lara "US Air Force Faces 500 Fighter Pilot Shortfall." *Defense News*, March 11, 2016. <http://www.defensenews.com/story/defense/air-space/2016/03/09/us-air-force-facing-500-fighter-pilot-shortfall/81530748>
- Sherman, Stephen. "Billy Mitchell: Early Airpower Advocate." *Ace Pilots*, April 16, 2012, http://acepilots.com/wwi/us_mitchell.html
- Steinbuch, Yaron and Schram, Jamie. "It Looks Like We Smoked This Son of a Bitch," *The New York Post*, 12 November 2015. <http://nypost.com/2015/11/12/us-airstrike-targets-jihadi-john/>
- Swarts, Phillip. "F-35 helmet costs \$400,000 — 4 times that of predecessor." *Air Force Times*, 26 October 2015. <http://www.airforcetimes.com/story/military/2015/10/26/f-35-helmet-costs-400000-4-times-predecessor/73826180/>

- Swarts, Phillip. "Wanted: A Few Good Pilots." *Air Force Times*, March 21, 2016.
<http://www.airforcetimes.com/story/military/2016/03/21/career-rpa-pilot-job-drone/81883080/>
- Major Taschner, Michael J. "Examples of Air-mindedness From America's First Operational Air Campaign: The St. Mihiel Offensive, 1918." *Air University: Air Command and Staff College*, Maxwell AFB, AL, March 1997.
- Terkel, Amanda. "Air Force Worried No One Wants to be a Drone Pilot." *Huffington Post*, 16 January 2015. http://www.huffingtonpost.com/2015/01/16/drone-pilots_n_6488600.html
- Trueman, T.N. "Aircraft and World War One." *The History Learning Site*, March 3, 2016,
<http://www.historylearningsite.co.uk/world-war-one/aerial-warfare-and-world-war-one/aircraft-and-world-war-one/>
- Tucker, Patrick. "US Air Force to Ask for More Drones." *Defense One*, December 11, 2015.
<http://www.defenseone.com/technology/2015/12/us-air-force-ask-more-drones/124424/>
- Tutorials Point. "MARS Model of Individual Behavior." *Individual and Group Behavior Models*.
http://www.tutorialspoint.com/individual_and_group_behavior/mars_model_individual_behavior.htm
- United States Air Force. *Air Superiority 2030 Flight Plan*, Air Force Enterprise Capability Collaboration Team, May 26, 2015, Washington, D.C.
- United States Air Force. *MQ-9 Reaper*, Air Combat Command Public Affairs Office, September 23, 2015. <http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104470/mq-9-reaper.aspx>
- United States Air Force. *F-16 Fighting Falcon*. Air Combat Command Public Affairs Office, September 23, 2015.
<http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104505/f-16-fighting-falcon.aspx>
- United States Air Force. *Officer: Pilot*. Air Force Officer Career Field Descriptions,
<https://www.airforce.com/careers/detail/pilot/>
- United States Air Force. *Remotely Piloted Aircraft (RPA) Pilot Initial Flight Training*. Air Education and Training Command/A3FP, Randolph AFB, TX, May 2016.
- United States Air Force. *Watch Videos*, Aircraft and Flight, <https://www.airforce.com/watch-videos>
- United States Air Force. *What Areas Interest You?* Aircraft and Flight,
<https://www.airforce.com/careers/browse-careers>

United States Government Accountability Office. "Actions Needed to Strengthen Management of Unmanned Aerial System Pilots."

United States Air Force Historical Research Agency. "The Birth of the United States Air Force." *United States Air Force*, January 9, 2008.
<http://www.afhra.af.mil/factsheets/factsheet.asp?id=10944>

Warwick, Graham. "Aurora Claims Endurance Record For Orion UAS." *Aviation Week Network*, 22 Jan 2015. <http://aviationweek.com/defense/aurora-claims-endurance-record-orion-uas>

Zenko, Micah. "Obama's Embrace of Drone Strikes Will Be a Lasting Legacy." *The New York Times*, January 12, 2016. <http://www.nytimes.com/roomfordebate/2016/01/12/reflecting-on-obamas-presidency/obamas-embrace-of-drone-strikes-will-be-a-lasting-legacy>

