WIDENING THE TRAINING PIPELINE:

Are Warrant Officer Instructor Pilots the Best Solution to Increase Pilot Production?

Aaron R. Ewing, Major, USAF

Wright Flyer Papers

Please send inquiries or comments to

Editor
The Wright Flyer Papers
Department of Research and Publications (ACSC/DER)
Air Command and Staff College
225 Chennault Circle, Bldg. 1402
Maxwell AFB AL 36112-6426

Tel: (334) 953-3558
Fax: (334) 953-2269

E-mail: acsc.der.researchorgmailbox@us.af.mil

AIR UNIVERSITY

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Muir S. Fairchild Research Information Center
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Foreword

It is my great pleasure to present another issue of The Wright Flyer Papers. Through this series, Air Command and Staff College presents a sampling of exemplary research produced by our resident and distance-learning students. This series has long showcased the kind of visionary thinking that drove the aspirations and activities of the earliest aviation pioneers. This year's selection of essays admirably extends that tradition. As the series title indicates, these papers aim to present cutting-edge, actionable knowledge—research that addresses some of the most complex security and defense challenges facing us today.

Recently, The Wright Flyer Papers transitioned to an exclusively electronic publication format. It is our hope that our migration from print editions to an electronic-only format will foster even greater intellectual debate among Airmen and fellow members of the profession of arms as the series reaches a growing global audience. By publishing these papers via the Air University Press website, ACSC hopes not only to reach more readers, but also to support Air Force–wide efforts to conserve resources. In this spirit, we invite you to peruse past and current issues of The Wright Flyer Papers at https://www.airuniversity.af.edu/AUPress/Wright-Flyers/.

Thank you for supporting The Wright Flyer Papers and our efforts to disseminate outstanding ACSC student research for the benefit of our Air Force and war fighters everywhere. We trust that what follows will stimulate thinking, invite debate, and further encourage today's air, space, and cyber war fighters in their continuing search for innovative and improved ways to defend our nation and way of life.

EVAN L. PETTUS
Brigadier General, USAF
Commandant

Abstract

The United States Air Force is struggling to cope with a worldwide pilot shortage that has left the service over 2,000 pilots short of what is needed to fully man its squadrons. With pilot retention declining in a time of unprecedented airline hiring, the service is desperately trying to find ways to increase pilot production. To recover from the current shortage, the Air Force has determined it needs to increase annual production from 1,200 to 1,600 pilots per year. Despite identifying a need for increased production, the service has yet to identify a clear method to accomplish this task. A 33 percent increase of students will necessitate an increase of undergraduate pilot training (UPT) instructors; where the Air Force intends to find additional instructors given the current pilot shortage is unclear.

This research paper seeks to fill this gap in knowledge by answering the question, are warrant officers the best solution to increase UPT instructor manning to achieve the overarching goal of producing 1,600 pilots per year? To answer the question, this study used a problem/solution framework to compare four methods of increasing pilot production: warrant officer UPT instructors, contracted civilian UPT instructors, increasing the number of first assignment instructor pilots, and timeline reductions via the Pilot Training Next program. The four methods were assessed against five criteria: timeliness of implementation, personnel cost savings, training squadron manning stability, impact on operational squadron manning, and quality of training. Ultimately, this study concluded that warrant officers are not the best option, however, neither are any of the other methods. The problem of increasing pilot production is too complex to be solved with a single, silver-bullet solution. While no single method could sufficiently satisfy all five criteria, applying all four methods in parallel does have the potential to meet the Air Force's goal of producing 1,600 pilots per year.

Introduction

Overview of the Study

The United States Air Force (USAF) is contending with the most severe pilot manning crisis in its 71-year history. The former Secretary of the Air Force, Heather Wilson, has stated that active duty, guard, and reserve total force is currently over 2,000 pilots short of what it needs to fill its billets.[1] While many factors are at play, years of declining retention in a time of unprecedented airline hiring and a significant decrease in authorized end strength despite substantial mission growth for the Air Force, have contributed significantly to the current pilot shortage. To address the shortage, Air Force is focusing efforts on improving pilot retention and increasing pilot production. This research project will focus on the latter effort by investigating how the Air Force can best achieve its goal of increasing pilot production at a time when the current inventory of available instructor pilots is at a premium.

One of the potential solutions the paper will investigate is utilizing warrant officers to serve as undergraduate pilot training (UPT) instructors. While the Air Force eliminated warrant officers from its rank structure long ago, all three sister services currently and successfully employ warrant officer pilots in daily operations. Over the next several years the Air Force intends to increase its overall end strength, presenting an opportunity for the service to reconsider if it now has a need for warrant officers in the force. This paper hypothesizes that warrant officers are the best long-term solution to the UPT instructor manning problem and will compare this course of action to several alternatives to determine the best way forward.

Nature of the Problem

In February 2017, the chief of staff of the Air Force (CSAF) established an aircrew crisis task force with the purpose of identifying factors that drive declining retention and recommend initiatives to reverse the trend. The task force identified that problems in work/life balance, quality of service, and pay discrepancies between military and airline pilots were the primary factors causing pilots to leave military service. To address these problems the task force presented 44 initiatives to the CSAF for approval and at the time of this writing 37 of the task force's recommendations had been implemented.[2] Hopefully these initiatives serve their intended purpose and retention rises; however, retaining current pilots will only help short-term manning stability

in flying squadrons. In order to achieve long-term pilot manning stasis, the Air Force must increase pilot production.

To alleviate the shortage, Air Force has determined that it is necessary to increase the pilot production rate from 1,200 to 1,600 pilots per year.[3] If the Air Force intends to increase the number of yearly students by 33 percent a corresponding increase in required instructor pilots should be expected. Therein lies the problem, as the Air Force has yet to reveal where it is going to find additional instructors in times of a pilot shortage. Furthermore, given the ceaseless pace of combat operations, the Air Force must find a way to increase instructor manning without negatively impacting combat capability.

Purpose of the Study and Research Question

Reassigning pilots from combat squadrons to serve as UPT instructors is the only method the service currently implements to increase instructor manning at flying training squadrons. Continuing to do so will have negative implications to combat capability as operational squadrons already suffer from manning shortages. Any additional reduction in personnel will only further degrade the unit's ability to project combat airpower. Thus, it is imperative that the Air Force find alternative solutions to increase its pool of UPT instructor pilots. This paper will investigate and compare various potential sources of instructor pilots in order to answer the following research question: are warrant officers the best solution to increase UPT instructor manning in order to achieve the overarching goal of producing 1,600 pilots per year?

Research Structure and Methodology

This research paper will utilize the problem and/or solution framework to identify the best method to increase instructor pilot manning at UPT squadrons and will compare the warrant officer option against three alternative methods that could feasibly increase pilot production: bolstering the number of first assignment instructor pilots, implementing contracted civilian instructors, and reducing the timeline to produce a pilot via the Pilot Training Next program. Each option will be weighed against five criteria: timeliness of implementation, personnel cost savings, stability in training squadron manning, impact on operational squadron manning, and quality of training. This analysis will be essential in determining if warrant officers are the best solution to increase instructor pilot manning at UPT squadrons to meet the Air Force's target of producing 1,600 pilots per year.

Examining the factors that lead to the current pilot shortage and understanding how the Air Force arrived at this unfortunate state of affairs will be

essential to provide a context in determining if warrant officer instructor pilots have advantages over the current practice of using traditional officers as UPT instructors. Additionally, statistical data on pilot manning shortages by mission area will be analyzed to demonstrate that the Air Force will be unable to increase instructor manning utilizing the current pool of pilots without causing unacceptable harm to combat squadron manning.

Next, the paper will outline the history of the warrant officer in the USAF, as well as the reasoning behind the decision to eliminate the rank. Understanding this history is necessary to comprehend why Air Force senior leaders are so resistant to the notion of reinstating the rank structure. While serving as the 17th chief master sergeant (CMSgt) of the Air Force, James Cody conducted a video all call in which he provided insight into the Air Force's position on warrant officers, "When we really have a conversation about warrant officers, we're talking about money, you don't get different people; they don't get any better at their job. You just pay people different."[4] If this paper is to succeed in its goal of demonstrating how warrant officers could provide exceptional value in the realm of pilot training, it will be necessary to address counter opinions held by senior Air Force leaders such as CMSgt Cody. Understanding the logic behind why the Air Force determined warrant officers were unnecessary is a necessary step in producing a counterargument.

Unlike the USAF, the US Army, Navy, and Marine Corps have employed warrant officers during the entirety of their existence. Research on sister service viewpoints on the roles, responsibilities, and employment of warrant officers will be presented to show that the Air Force may have missed the mark in its original decision to eliminate the rank structure. In order to set the foundation for the primary analysis of this paper, it must first be established that warrant officers have a place in the modern Air Force.

Literature Review

Factors Driving the Pilot Shortage

The Air Force's capacity to train new pilots is wholly dependent on having a cadre of experienced pilots available to instruct new students. Years of declining pilot retention combined with congressionally mandated force reductions have produced a climate where increasing pilot production will be difficult. While many intangible factors contribute to a pilot's decision to leave military service, such as quality of life and increased stress from persistent combat operations, the Air Force pilot attrition rate has a definitive direct correlation to airline hiring. Figure 1 includes data from a study on Air Force

pilot attrition that not only confirms this correlation but also predicts that the airline hiring rate will continue to increase until 2027.

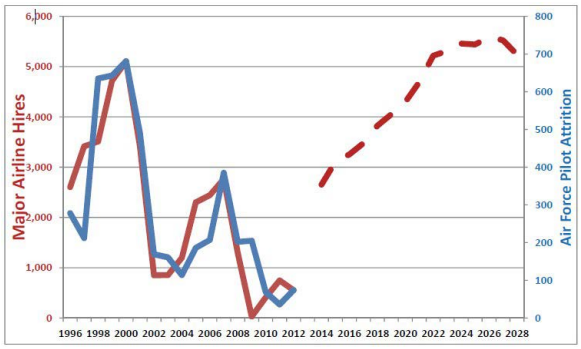

Figure 1. Airline hiring versus Air Force pilot attrition [5]

With airline hires expected to increase over the next decade, it is logical to assume Air Force attrition will continue to rise and the service is scrambling to find ways to influence pilots to stay. In addition to nonmonetary initiatives designed to reduce additional duties and improve quality of life, the Air Force recently increased the maximum aviation bonus to $455,000 in return for an additional thirteen-year service commitment by pilots eligible to leave in fiscal year (FY) 2018. At the time of this writing, only 34.6 percent of eligible pilots had accepted the bonus, falling well short of the 64 percent target the Air Force is hoping for.[6] It is clear that the pilot shortage is going to get worse before it gets better; however, declining retention is only partially responsible for the current shortage.

In addition to declining retention, the USAF pilot shortage is impacted by significant reductions in end strength compounded by an increase in mission responsibilities. The end of the Cold War precipitated a massive military force reduction that resulted in decreasing USAF authorized end strength from over 500,000 in 1991 to only 311,000 in 2016.[7] Despite the 38 percent decrease in manpower, the USAF has experienced significant growth in responsibilities over the past 27 years as mission sets that did not previously exist began to materialize. During the Cold War, remotely piloted aircraft (RPA) existed only in the minds of innovators. Today, the war on violent extremism employs over 60 RPA combat orbits with 24-hour coverage, necessitating over 1,100 pilots to meet the demand.[8] Although space and cyber operations existed at the end of the cold war, the scope of responsibility in each domain has magnified as the increasing threat from state and nonstate actors challenge the United States' ability to maintain information dominance. In 2016 alone, over 4,000 offensive cyber operations were conducted against more than

100,000 adversarial targets.[9] While space and cyber do not require pilots to conduct operations, significant growth in cyber and space personnel limit the Air Force's ability to increase pilot authorizations due to congressional restrictions on authorized end strength. To put it simply, the USAF is too small to meet its worldwide commitments.

Senior Department of Defense (DOD) leadership has recognized this fact and is asking for congressional approval to grow. The Air Force's current authorized end strength sits at 325,100 for FY 2018. FY 2019 budget request seeks an increase to 338,800 by 2023.[10] If approved, the USAF should be judicious with the application of additional manpower. Clearly, some of the additional personnel will be used to bolster the pilot corps. However, Air Force must consider if the current practice of solely using commissioned officers as pilots remains the best course of action.

Given that sister services successfully employ warrant officers as pilots, the opportunity for end strength growth opens the door for the Air Force to reconsider its pilot rank structure. CMSgt Cody's argument that changing a pilot's rank from commissioned to warrant officer does not add capability is valid if pilot authorizations remain constant. However, if an increase in end strength is approved, the Air Force could gain significant capability by reinstating warrant officers to serve as UPT instructors. Doing so would allow hundreds of officers currently assigned to pilot training squadrons to return to their primary airframe, thereby restoring significant combat capability to the force.

Pilot Shortages by Fixed Wing Mission Set

In April 2018, the Government Accountability Office (GAO) was directed by the US Senate to research the DOD's management of the pilot workforce. The goal was to identify the extent of the difference between actual manning and pilot authorizations for each branch of the military. During FY 2017, the GAO found that the USAF had the following fixed wing pilot shortages or overages by mission area: -27 percent fighter, -8 percent bomber, 3 percent mobility, 24 percent surveillance, and -13 percent special operations.[11] Ignoring the differences in mission set, the Air Force was 8 percent short of the pilots needed to fill its authorizations across the force in FY 2017.

With shortages in three of the five primary mission areas, the Air Force is struggling to find pilots to serve as undergraduate pilot training instructors. In order to sustain combat operations, the Air Force has already begun to shift the excess mobility and surveillance pilots to man positions in basic pilot training that would traditionally be staffed by fighter, bomber, and special operations pilots; however, this course of action is unsustainable.[12] With air-

line hiring rates expected to increase until 2027, the trend of declining retention is going to linger. If the Air Force continues to cash in overages of mobility and surveillance pilots, then shortages will inevitably occur in those communities as well. If the Air Force is going to achieve manning stability for all operational units, then it is essential that it rapidly develops a cadre of pilots dedicated to training. The Air Force needs a pilot that focuses on basic pilot training for their entire career, and as this paper will investigate, warrant officers may fill that niche requirement.

History of the Warrant Officer in the USAF

Birth of the USAF Warrant Officer. The origins of the USAF warrant officer can be traced to the rank structure created by the Army Air Forces (AAF) during World War II. The explosive growth of personnel during the war resulted in the AAF end strength increasing from 21,000 to over two million soldiers.[13] To keep the service from becoming too top heavy in commissioned officers, the Army appointed warrant officers in over 40 different specialties and created entirely new categories of rank, including the new position of flight warrant officer. As a result, thousands of aviation cadets who traditionally would hold commissioned officer ranks instead entered service as flight officers.

Prior to the war, it was not abnormal for enlisted men to serve as pilots. However, as aircraft became more complex, the aircrew positions required for safe operation increased. This created a discontinuity in the chain of command as enlisted pilots would technically be the aircraft commander of officer crewmembers serving in other crew positions. To resolve this dilemma, the Pentagon held the position that flight officers were to be treated as "third lieutenants" and were due all the same customs and courtesies as commissioned officers.[14] The chaos of war tended to drown out any objections by commissioned officers about the rank authority of this so-called third lieutenant. However, as the hostilities ended, confusion on how the rank truly fit into the chain of command grew since flight officers were technically not enlisted men, nor were they commissioned officers.

Post-WWII confusion on warrant officers. The significant drawdown after the war and the establishment of Air Force as a separate military branch resulted in the service inheriting over 1,200 warrant officers from the former AAF rank structure.[15] Though the appointment of flight officers ceased, the Air Force continued to appoint warrant officers without any clear career path for them. Throughout the 1950s the Air Force struggled to find an identity for its small warrant officer corps. In 1953, Air Force Regulation 36–72 defined a

warrant officer as "a technical specialist with supervisory ability, who is appointed for duty in one superintendent Air Force specialty."[16] However, this definition did not sufficiently encapsulate how the role of a warrant officer was distinct from an enlisted noncommissioned officer. Similarly, at a time when numerous warrant officers filled commissioned officer positions, this definition did not identify how the responsibilities of a superintendent were significantly different from those of junior commissioned officers.[17] Additionally, the Air Force and Congress were at odds on warrant officer appointments. The Air Force clearly believed warrant officers were distinct from commissioned officers; however, the Officer Grade Limitation Act of 1954 mandated that warrant officers be counted against the cap on officer authorizations.[18] As confusion on the appropriate roles and responsibilities of warrant officers continued, the debate began on whether or not the USAF should divest itself of the rank.

Death of the USAF warrant officer. To resolve the confusion, the Air Force directed the officers of Air Command and Staff School to investigate whether or not the service truly required warrant officers to accomplish the mission. In 1954 they published the results of their study in a report entitled *Should We Eliminate the Grade of Warrant Officer in the Air Force*. The investigating officers found that the majority of warrant officer appointments were being used as a reward for outstanding master sergeants who had reached a ceiling in promotability after achieving the maximum grade of E-7. They also identified that the Air Force needed to enhance the prestige of the senior noncommissioned officer corps in order to restore their authority to hold supervisory positions; however, they concluded that maintaining the warrant officer ranks at the top of the enlisted career ladder was not the best method to do so.[19]

The Air Force needed to provide upward career mobility for its senior enlisted members in order to satisfy a need for enlisted supervision at the group, wing and major command level. To provide this upward mobility they recommended that warrant officers be eliminated and realigned to a "Warrant Airmen" or "Superintendent" construct which focused more on supervisory and management responsibilities, rather than on technical expertise.[20] This concept eventually morphed into the E–8 and E–9 ranks in use today and the subsequent death of the warrant officer grades.

Warrant Officer Utilization in Sister Services

During the 1950s, the fledgling Air Force underwent a period of self-reflection as it attempted to carve out a unique service identity. In this process, a need for senior enlisted supervision was identified and concluded that

a warrant officer's focus on technical expertise was incompatible for this role. However, during this time, the Air Force failed also to consider whether it had a need for some members to remain technical experts in their craft. The force reductions following WWII also challenged sister services to codify the roles and responsibilities of warrant officers. However, the Army, Navy, and Marine Corps reached different conclusions than the air service as evidenced by their successful utilization of warrant officers across numerous occupations today.

United States Navy. The US Navy (USN) has employed warrant officers longer than any other branch of the armed forces. In 1775 with the outbreak of the Revolutionary War, Continental Congress established warrant officer grades to serve in eight unique positions upon newly commissioned frigates to combat the British.[21] These men were initially selected based upon their expertise in civilian trades such as surgery, carpentry and gunnery. As the naval technology matured, the Navy continued to add warrant officers to its force to meet its demand for specific technical knowledge. By WWII, the initial eight career fields had expanded to twelve and vast numbers of warrant officers had been added to meet wartime demands.[22]

Though the warrant officer has been a near constant position throughout the history of the Navy, the necessity of the rank has not always been without question. Similar to the experiences of the USAF, the personnel drawdown following WWII challenged the Navy to consider whether or not warrant officers were still necessary. From 1951 to 1959 three investigative boards were convened to determine how warrant officers fit into the rank structure of the Navy. These boards ultimately decided to follow the same path as the Air Force and eliminated warrant officers in favor of adding the senior enlisted E-8 and E-9 ranks.[23] As a result, this decision would not last for long. Drastic cuts in the warrant officer corps between 1959 and 1962 left the Navy struggling to find a replacement for the loss in technical expertise aboard its ships. In 1963 the warrant officer issue was reopened by another investigative board which determined that warrant officers should not only be reinstated but their use should be expanded because of the rapidly growing technological capabilities of modern warships.[24]

While the Air Force held true to its initial decision, the Navy reversed course and today there are twenty-six occupational designations where warrant officers dutifully serve, including for a period of time, as pilots.[25] In 2006, the Navy faced challenges with producing enough commissioned officers to meet its demand for pilots during a period of high accession. In response, the Navy began an experimental program that generated warrant officer pilots to replace a portion of commissioned officers in squadrons with extensive junior officer aviator populations. The goal was to create flying specialists that would

not be required to follow the traditional career path of a commissioned officer but would be able to remain flying without negative career repercussions.[26] Although the program was terminated in 2013 when the Navy reevaluated its personnel requirements and no longer had a need to supplement its pilot billets with warrant officers, it effectively proved that warrant officers could reliably serve as aviators.[27]

The demise of the warrant officer in the Air Force was largely due to its inability to find a difference in responsibilities between senior noncommissioned officers and warrant officers. However, the Navy was able to resolve this confusion. The Navy defines an E–9 as a "senior enlisted leader responsible for matters pertaining to leadership, administrative, and managerial functions involving enlisted ratings." In contrast, a warrant officer is "a technical leader and specialist who directs technical operations in a given occupational specialty and serves successive tours in that specialty, yet remains the technical expert."[28] As will be discussed later in the analysis section of this paper, it is this focus on technical leadership over successive tours that make warrant officers an appropriate fit for the Air Force as UPT instructors.

United States Marine Corps. The origin of warrant officers in the Marine Corps can be traced back to WWI when Congress passed the National Defense Act of 1916, authorizing the military to expand quickly in response to the great European war. Driven by technological advancements and in demands resulting from rapid personnel growth, the Marine Corps instituted warrant officers for a specific purpose, "to maintain a selected body of personnel with special knowledge, training, and experience along particular lines . . . beyond those required of noncommissioned officers."[29] Initially, 84 warrant officers were appointed as quartermaster clerks and marine gunners. Once the United States officially entered WWI, the demand for commissioned officers in the Marine Corps increased and all but three of the initial 84 warrant officers were granted temporary commissions as second lieutenants.[30] At the war's conclusion, the need for officers decreased and the temporary lieutenants reverted back to the grade of warrant officer. Similarly, growth of the Marine Corps occurred during WWII. On a greater scale, Congress authorized the appointment of 576 warrant officers as well as granting the Secretary of the Navy the responsibility for career management of warrant officers, including temporary commissions up to the rank of captain.[31]

Following WWII, the lines of responsibility between warrant and commissioned officers became blurry. The Marine Corps trod a similar path as the Air Force and Navy as it fought to alleviate the confusion. In 1959, the Marine Corps headquarters directed a study on the warrant officer force structure which clarified the role of the rank. First, warrant officers jobs would be tech-

nical in nature and require long on-the-job or specialist training. Second, their level of supervision would not require formal education such as a bachelor's degree. Third, the rapid turnover of warrant officers was undesirable. Finally, warrant officers should only be employed in technical positions that were not suitable to prepare a commissioned officer for broad, general, or command duties.[32] This concept of employment for warrant officers has sustained effectiveness in the Marine Corps to the present day.

Current Marine Corps regulations define a warrant officer as "a technical officer specialist who performs duties that require extensive knowledge, training, and experience with the employment of particular capabilities which are beyond the duties and responsibilities of senior noncommissioned officers."[33] Under this guidance, Marine Corps warrant officers are divided into two functional based categories: marine gunner and technical warrant officer. Marine gunners are experts in all aspects of infantry weapons and experts as unit lead instructors for tactical training programs. In contrast, technical warrant officers specialize in technical noncombat arms specialties such as intelligence and electronics maintenance.[34] Although, the Marine Corps does not utilize warrant officers as pilots, the demonstrated experience and stability that they provide to technically oriented career fields helps one to conceptualize how warrant officers could be beneficial to USAF pilot training squadrons.

United States Army. The US Army (USA) warrant officer corps recently passed a 100-year milestone in dutiful service to the nation. In July 1918, the US Congress first introduced Army warrant officers to serve in the Coast Artillery Corps as mine planters charged with the defense of major ports during WWI.[35] After the war, the Army warrant officer corps followed a similar path as its Navy and Marine counterparts. The force was initially reduced and subsequently expanded in preparation for WWII. By the end of WWII, the Army warrant officer corps had grown to over 57,000 soldiers serving in 40 occupations.[36]

During the 1950s the Army began to diverge from its sister services regarding warrant officers. While other branches questioned if warrant officers were needed, the Army greatly expanded its use of the grade. The establishment of the Air Force as a separate branch of service in 1947 resulted in the Army losing a substantial portion of its aviators and warrant officers. These officers were chosen as the answer to the pilot shortage problem. The Army graduated its first class of warrant officer helicopter pilots in 1951. Among its regular officers, warrant officers provided valuable continuity within the Army's aviation program which often suffered from rapid assignment rotation.[37]

Though the Army did not question the need for warrant officers after WWII, it did adjust the lens through which the rank was viewed. Prior to the

war, warrant officer grades were utilized as a tool to reward long-serving enlisted men, as well as former commissioned officers of WWI who lacked the educational requirements necessary for continued commissioned service.[38] Because the service lacked a clear policy on warrant officers entering WWII, appointment, assignment, promotion, and training were decentralized to major commanders, which resulted in a disorganized force upon the war's conclusion.[39] To establish centralized personnel management, the Army conducted several studies during the 1950s in order to formalize the purpose and form of the warrant officer program. These studies culminated in 1957 with the Army publishing a definition of a warrant officer as "a highly skilled technician who is provided to fill positions above the enlisted level which are too specialized in scope to permit the effective development and continued utilization of broadly-trained, branch-qualified commissioned officers."[40]

Over the following six decades the Army warrant officer corps continued to evolve. Though the specific occupations have changed to match the demands of emerging technology, the focus on technical and tactical employment of weapon systems has remained constant. Current Army regulations highlight this unique aspect of warrant officer grades: "warrant officers remain single-specialty officers whose career track is oriented towards progressing within their career field rather than focusing on increased levels of command and staff duty positions."[41] This perspective, discussed later in this paper, suggests that proper utilization of warrant officers could significantly enhance unit manning stability. Furthermore, given the successful track record of warrant officer pilots in the Army, and the specific technical nature of instructing basic flight training, warrant officers could provide exceptional value to USAF pilot training squadrons.

Warrant Officer Accession Timelines

The Army, Navy, and Marine Corps all recognize that the value of a warrant officer lies in their technical expertise at the tactical level of warfare. However, the three services differ on determining when a person has the experience level necessary to validate appointment into the warrant officer corps. The three personnel management models in use by the DOD for warrant officer accessions are early select, mid-career select, and late-career select.

The early select model is the least applied method as it is utilized only by the Army and specifically to acquire warrant officer pilots. Under this model, the Army selects approximately seventy-five percent of its pilots from soldiers in their first or second term of enlistment with two to eight years of military experience in any occupation. The remaining quarter of Army aviators are recruited

directly from civilian life.[42] The ability to select pilots from outside its ranks provides significant advantages to the Army by expanding the applicant pool. Many civilian applicants have prior flight experience which increases the likelihood that the trainee will successfully graduate from military flight school.

The mid-career select model is used to select warrant officers in technical career fields for both the Army and the Marine Corps. For both services, an applicant must have achieved a minimum grade of sergeant (E-5) and the member must have typically completed 10 to 15 years of military service upon selection.[43] The jobs of technical warrant officers in the Army and Marine Corps are closely related to the same occupational area that they worked as an enlisted members.[44] Many of these technical warrant officer billets have comparable responsibilities to jobs found in the civilian sector, such as equipment maintenance. However, because the services do not recruit civilians for direct accession into technical warrant officer positions, the applicant pool in the mid-career select model is considerably smaller than the early select model.[45]

The Navy stands alone in using the late-career select model to appoint warrant officers. Prior to applying for warrant officer, Navy candidates must have reached the rank of chief petty officer (E-7). Almost all newly appointed naval warrant officers have at least 14 years of service. Occasionally, the applicants have over 20 years of military experience and were eligible to retire.[46] Similar to the Army and Marine Corps, the Navy values the technical expertise of its warrant officer corps and assigns them to supervisory and training positions that align with their previous enlisted specialties. However, unlike the other services, the Navy does not consider warrants to be "junior officers" in these positions due to their extensive experience in military service.[47]

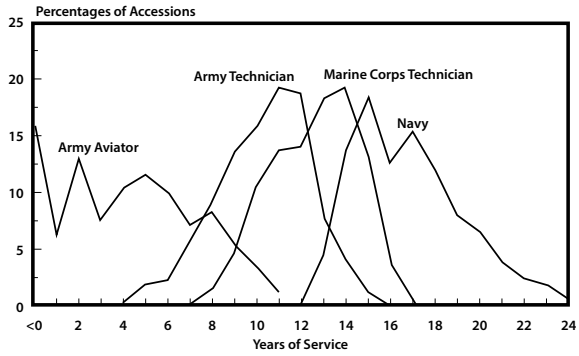

Figure 2. Distribution of warrant officer accessions by years of service[48]

Figure 2 provides a graphical presentation of the differing patterns of warrant officer accessions among the three services. From this figure, it becomes

clear that each military branch has a different viewpoint on the requisite experience level to serve as a warrant officer. Note that Army aviators are the warrant officer corps with the least time in military service at accession. In order to qualify for Air Force pilot training, a candidate must begin flight training before age 30.[49] For this reason, if the Air Force was inclined to reinstate its warrant officer corps to serve as pilots, it would need to adopt an accession strategy that is similar to the one in use by the Army. For the purposes of analysis later in this paper, an assumption is made that Air Force warrant officer pilots would be obtained via the early select method described above.

Alternative Options to Increase Pilot Production

Additional first assignment instructor pilots. One option that may allow the Air Force to bolster instructor manning at UPT squadrons is to increase the allocation of first assignment instructor pilots (FAIPs) per graduating class. The current assignment process for graduating pilots is described in Air Education and Training Command Instruction (AETCI) 36–2504. Prior to receiving a follow-on assignment in a major weapon system (MWS), a student's training performance is evaluated to determine their potential to complete the training successfully.[50] A student's academic test scores, daily flight performance, check ride grades, and flight commander rankings are compiled to produce a merit-based score.[51] These standardized scores are used to generate a class rank for each student which partially determines the follow-on aircraft they will fly.

Before receiving an assignment, each student indicates their follow-on aircraft preference from first to last. These preferences are combined with the class ranking to determine the student's next assignment. In general, the top student in the class should get the first assignment choice, assuming a training slot is available[52]. If one is not available, the second, third, or fourth preference would be assigned and so on. This process continues by class ranking until all assignments have been fulfilled.

The only exception to the process is a student receiving a flight commander's recommendation to become a FAIP. Typically, students receiving a FAIP recommendation are in the top third of the class. Pilots with instructor duties are required to have high maturity, flying, and interpersonal skills. When a quota for a FAIP is left unfilled after the process described above, a high performing student that otherwise may have received a preferred assignment is instead selected to remain on station to become a UPT instructor. The new pilot serves as a FAIP for three to four years, after which an assignment in another MWS is given. The leadership and supervisory responsibilities ac-

companying FAIP duties are limited; therefore, captains are prohibited from FAIP selection because of the negative career progression that would occur.[53]

Current regulations clearly indicate that FAIP assignments need to be filled, even if it means not giving a high performing student a preferred follow-on assignment. If the Air Force adjusted regulations to permit captains to serve as FAIPs, the pool of potential instructor pilots could be immediately increased. Furthermore, there are typically only one or two FAIP assignments per graduating class. The Air Force could quickly improve its UPT instructor manning by increasing the number of FAIP assignments given to each class. However, such an action would temporarily decrease manning in operational squadrons until an increase in yearly student production is obtained from the additional instructor capacity. Given the current manning shortages in operational squadrons combined with ongoing combat operations, it is unclear if this is an acceptable premise.

Contracted civilian instructors. The second option the Air Force may use to increase instructor manning at UPT squadrons is to expand the resource pool by looking outside its own ranks to the civilian market. The Air Force has a recent history of utilizing contracted civilian pilots to fill manning shortages in noncombat specialties across the force. Congressionally mandated force reductions in 2014 forced the Air Force to close the 65th Aggressor Squadron, resulting in a fifty percent reduction in organic red air support capacity at Nellis Air Force Base.[54] To resolve this problem, the Air Force awarded Draken International a contract to provide adversary training support sorties for weapons school, operational test, and Red Flag exercises. The company owns a fleet of A-4 and L-139 decommissioned military aircraft that are flown by contracted civilian pilots. The demonstrated success of this contract has led the Air Force to expand its use of contracted red air. In August 2018, the Air Force released a request for proposals, annually soliciting bids to support 30,000 adversary air sorties in the continental US, Alaska, and Hawaii.[55]

At first glance, contract pilots seem like a logical solution to supplement Air Force pilot shortages; however, the civilian option is not without potential pitfalls of its own. First, the pilot shortage is not limited to the Air Force but is a worldwide problem. The rapid growth of air travel in Asia is increasing worldwide demand for pilots. Current estimates project a need for over 23,000 new pilots per year until 2029.[56] The Air Force is only one of many players in competition for experienced pilots, and will undoubtedly face significant challenges recruiting them. Second, while the civilian market could expand the pool of potential instructor pilots, the expansion would be limited by the fact that not every civilian pilot is a suitable candidate to become a military flight instructor. The performance characteristics of Air Force training air-

craft far exceed anything an average civilian pilot would have experienced. As such, former military pilots are the most likely candidates to easily make the transition to UPT instructor without requiring extensive training.

Timeline reductions via the pilot training next program. The final method this paper will analyze to determine the best way to increase pilot production involves reducing the timeline to produce a pilot via syllabus reductions and simulation. If the Air Force intends to increase the number of students yearly, reducing the syllabus requirements for live flights is probably a necessity, since the availability of daily sorties is limited by the fact that the training aircraft fleet is a fixed asset. Increasing the number of students would only increase the demand for flight time, so training opportunities must be found elsewhere.

The Air Force is already experimenting with this process in a program known as pilot training next (PTN). The PTN program is designed to reduce the overall cost and time it takes to produce a pilot by replacing flight hours with modern virtual reality simulators.[57] Currently, each UPT base uses five or six high fidelity simulators to train 300–400 students per year.[58] Because the simulators are such a low-density, high-demand asset, the students' simulator time is closely regulated, leaving little capacity for additional practice outside of designated syllabus events. As a result, the vast majority of instruction under the current pilot training syllabus occurs in the aircraft with students receiving approximately 200 flight hours before graduation.[59]

The PTN program is revamping flight simulation by investing in modern virtual reality technology. Instead of purchasing traditional simulators at the cost of two to three million dollars each, the Air Force has looked toward commercial off-the-shelf technology to lower costs. For a cost of approximately $10,000, a virtual reality headset and personal computer are programmed with an 'artificially intelligent' flight simulator program that offers feedback on the student's performance without a human instructor in the loop.[60] The significantly reduced cost allows the Air Force to provide each student a simulator for personal use at their residence, and the Air Force is hoping additional simulator time, and computer-based instruction will replace actual flight time.

In August 2018, the first graduates of the PTN program received their wings after only six months of training, far faster than the year it takes traditional UPT students to graduate.[61] Under the new syllabus, these newly minted pilots received only 60 hours of flight time before graduation, a seventy percent reduction compared to traditional UPT students.[62] Additionally, the PTN students did not fly the T-38, or T-1 follow-on trainers that traditional UPT students fly. After graduation, the students will proceed to train

for their assigned MWS having flown only the T-6 trainer. With the inaugural class being a test case and if the students fail to complete training for their primary MWS, they will return to UPT to complete the second half of the current syllabus in the T-38 or T-1.[63]

While some portion of flight time needs to be replaced by simulators, the Air Force must be careful in achieving the appropriate balance between the two. Simulation cannot accurately replicate the physical forces of flight that can create life-threatening cases of spatial disorientation and G induced loss of consciousness. Additionally, no amount of preprogrammed simulations can cover the nonstandard situations pilots experience in an actual air traffic control environment. Simulators are useful to practice the basics of standard departures, flight maneuvers, recoveries, instrument approaches, and pattern operations. However, in real-world situations, air traffic control will eventually issue an instruction that causes a safety issue with conflicting traffic or terrain that requires a pilot to rely on prior experience and judgement to diffuse the danger. The Federal Aviation Administration defines airmanship as "a sound knowledge of and experience with the principles of flight, the knowledge, experience, and ability to operate an airplane with competence and precision both on the ground and in the air, and the application of sound judgment that results in optimal operational safety and efficiency."[64] The key word in this definition is experience. While simulators help to build procedural knowledge, true airmanship is best obtained through actual experience in the air.

Comparison of Warrant Officers and Alternatives

To determine the best method for increasing instructor manning at UPT squadrons and annual pilot production, warrant officers, FAIPs, contractors, and the PTN program will be compared against the following five criteria: timeliness of implementation, personnel cost savings, training squadron manning stability, impact on operational squadron manning levels, and quality of training.

Timeliness of implementation. Of the four options outlined in this paper, increasing FAIP assignments is by far the quickest method to increase instructor manning at UPT squadrons. Within a span of only a few months, the Air Force could bolster instructor manning by giving additional FAIP assignments to the next graduating class of pilots. The training apparatus for FAIPs already exists, and the only delay in acquiring additional instructor pilots would be a short break after UPT graduation, while the newly winged aviator waits for a training slot to open in the two-month pilot instructor training (PIT) course.

Utilizing civilian contractors as UPT instructors is the second fastest method that could be implemented. However, two assumptions need to be made to validate this ranking. First, the time it takes for the Air Force to develop contract requirements, release a request for proposals, find contractors to submit proposals, and select a contract winner varies widely depending upon the scale of the contracted work. As such, an assumption is made that it would take one to two years to award the contract. If the Air Force was willing to issue contracts to individual pilots, rather than contracting a parent company to manage the workforce, this timeline could be reduced; however, research for this project revealed no instances in which this method of contract employment was utilized. The second assumption is that potential applicants would be limited to civilians with former military flight experience. As described earlier, a civilian that did not previously attend UPT would need extensive training to fly high-performance aircraft. This would only increase the total training bill for the Air Force, negatively impacting its ability to produce additional pilots. To become qualified instructors, former military pilots would only need to attend the same two-month PIT course that FAIPs complete. With these assumptions in mind, it would take approximately two to three years to acquire a sizable Corps of contracted instructor pilots.

The PTN program ranks third in the speed of implementation. The first iteration of the program is already completed and has produced its first round of pilots. However, because the program is experimental, there is still a large amount of uncertainty in the quality of pilots it produces. As described earlier, if the pilots fail to graduate training for their assigned MWS, they will be recycled to complete the second half of the traditional UPT syllabus. Depending upon the assigned MWS, it could take between four and twelve months for these students to complete follow-on training, providing the first chance to assess the effectiveness of the PTN program. The second iteration of PTN is already scheduled to begin in January 2019, and these students will follow the same syllabus as the first class.[65] In order to determine if the PTN syllabus has achieved an appropriate balance of simulator and flight time, it will take several years until enough students graduate to provide sufficient data points for statistical analysis. In the author's estimate, the PTN program is a minimum of five years from being ready for full implementation. However, if the first several rounds of PTN pilots perform competitively with pilots from the traditional UPT syllabus, this timeline could be reduced.

Warrant officer instructor pilots would be the lengthiest method to increase manning at UPT squadrons and for this reason, the Air Force would first need to develop a structure for training and career development of the rank. The Army currently has a comprehensive education system for warrant

officers that consists of preappointment, entry, advanced, senior, and master level courses.[66] Air Force has none of this training apparatus and would need to start from scratch. The Air Force could build these training programs incrementally by first developing the preappointment and entry-level training to get warrant officer appointments going. As the initial appointees promote up the warrant officer rank ladder, advanced courses could be developed to meet the need for further education. Incrementally developing training courses could move the timeline for appointing warrant officers earlier; however, it would still take several years to generate the initial courses. A second problem that would delay the appointment of Air Force warrant officers is the need to find applicability of the rank in multiple career fields. It would be impractical to generate an entirely new rank structure solely for the UPT instructor career field. However, the technical expertise that warrant officers provide could be a beneficial addition across numerous disciplines in the Air Force. Although, proving this case to senior Air Force leaders, as well as Congress, would undoubtedly take a significant amount of time. Due to these issues, the first Air Force warrant officer appointment would most likely be five to ten years away.

Personnel cost savings. Warrant officer instructor pilots have the highest potential to reduce personnel costs at UPT squadrons if they were used to fill billets currently occupied by company grade officers (CGO). In addition to instructor responsibilities, CGOs have additional duties within UPT squadrons that they perform when not in the cockpit. The duties assigned to lieutenants consist primarily of administrative tasks, with very little supervisory responsibilities. These tasks are well within the capabilities of any warrant officer to perform. Captains at UPT squadrons are typically assigned as flight commanders who supervise the lieutenants. While sister services primarily utilize warrant officers for their technical expertise, they are not restricted from serving in supervisory positions as their experience grows. For the purposes of analyzing potential cost savings, it will be assumed that warrant officers in the grades of W-1 and W-2 are used to replace first lieutenants (O-2), and similarly W-3s are fitting substitutions for captains (O-3).

Figure 3 shows the distribution of Army aviator warrant officer promotions by years of service. From this figure, it is important to note that in the Army aviator population, W-2 promotions typically begin at four years of service, and W-3 promotions begin after nine years of service. In this analysis, a similar promotion rate for the notional Air Force warrant officer instructor pilot will be used.

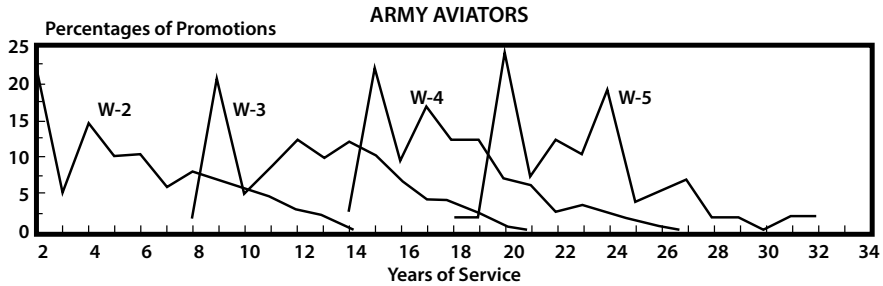

Figure 3. Distribution of Army Aviator promotions by years of service[67]

In the Air Force, officer promotions to first lieutenant occur automatically after two years of service, and promotions to captain happen after four years. Due to the time it currently takes to graduate UPT and subsequently complete training to become an instructor, virtually all FAIPs at UPT squadrons are first lieutenants with two to four years in service. It will be similarly assumed that warrant officers would have a minimum of two years of time in service before they are qualified instructor pilots. Furthermore, captains serving as flight commanders typically have anywhere between four and 10 years of time in service.

Pay Grade	2 or less	Over 2	Over 3	Over 4	Over 6	Over 8	Over 10
O–3	4,143.90	4,697.10	5,069.70	5,527.80	5,793.00	6,083.40	6,271.20
O–2	3,580.50	4,077.90	4,696.20	4,854.10	4,955.10	4,955.10	4,955.10
O–1	3,107.70	3,234.90	3,910.20	3,910.20	3,910.20	3,910.20	3,910.20
W–3	3,910.80	4,073.70	4,240.80	4,296.00	4,470.60	4,815.30	5,174.10
W–2	3,460.50	3,787.80	3,888.60	3,957.60	4,182.30	4,530.90	4,703.70
W–1	3,037.50	3,364.50	3,452.40	3,638.10	3,857.70	4,181.70	4,332.60

Table 1. 2018 Military Pay Chart-monthly basic pay

Adapted From: Defense Finance and Accounting Service, "Basic Pay," *2018 Military Pay Chart*, (Washington, D.C: Department of Defense Comptroller, 1 January 2018).

The outlined cells in Table 1 indicate the qualitative data that was used for comparison in order to determine the potential cost savings by using the warrant officer for CGO substitutions described above. For Example, a newly promoted O-3 was compared to a newly promoted W-3. From this data, if an O-2 is replaced by a W-1 or W-2, the annual personnel bill would be reduced by an average of $7,362 per person. The W-3 for O-3 substitution results in even greater annual savings at an average of $10,854 per person.

In addition to monetary savings from annual salaries, substituting warrant officers for CGOs could result in a significantly reduced obligation to pay retirement benefits because many warrant officers would likely separate before completing the 20 years of service needed to retire. As discussed earlier, the pay discrepancy between airline and military salaries is a significant factor in declining pilot retention. This discrepancy would only be higher for warrant officers and many would leave for higher paying civilian employment. In fact, less than half of Army warrant officer aviators complete 20 years of service.[68]

Finally, while the Air Force would lose its training investment as warrant officers separated after their 10-year service commitment, the loss would be far less for a warrant officer pilot than a commissioned officer because warrant officers would not have incurred additional expenses from training in another MWS. The GAO estimates that it costs approximately $11,000,000 to produce a fighter pilot. In contrast, the cost to produce a UPT instructor is approximately $1,000,000.[69]

The PTN program and increasing FAIP assignments tie for second in terms of reducing personnel costs, since there would mainly be no change to the current obligation. While the PTN program would save money in different ways, such as replacing expensive flight hours for simulators, the impact on personnel costs is negligible. It does not matter if a student is receiving instruction in an airplane or a simulator, the fact remains that an instructor needs to be there to teach the student. If that instructor is a commissioned officer, the cost of employing them remains unchanged. Similarly, increasing the use of FAIPs only adds more commissioned officers to the payroll, and by doing so, there are no unrealized savings in personnel costs.

Contract pilots rank fourth in personnel savings primarily because it is impossible to say whether they would be cheaper than using commissioned officer instructor pilots. Conversely, contractors may actually increase costs to the US taxpayer because their salaries need to be competitive with other opportunities in the civilian market. When military pilots are already leaving service for higher salaries in the civilian sector, any contract the Air Force proposes must provide an incentive that is more attractive than what the airlines provide. There is serious international competition to acquire pilots. For example, Air China is offering salaries beginning at $16,500 per month to American pilots willing to fly for a foreign airline.[70] If the Air Force does bring competitive contract salaries to the table, it may inadvertently exacerbate its retention problem and end up paying recently separated UPT instructors more money to do the same job.

Some may argue that contractors would save money on healthcare costs over military personnel; however, the relatively young age and good health of

the Air Force's pilot community does not typically result in numerous expensive hospital visits. Furthermore, a pilot with the necessary experience to be hired by the airlines is unlikely to take a job as an Air Force contractor that does not pay enough to cover health insurance. While healthcare costs may not be directly absorbed by the Air Force, it would inevitably be incurred through a higher contract salary.

Training squadron manning stability. Warrant officers are the best option to bring instructor manning stability to UPT squadrons because they can work in a single vocation for an entire career. In contrast, commissioned officers require a wide breadth of knowledge because eventually they will lead large and diverse groups of people. Wing commanders need to have a general understanding of operations, maintenance, logistics, base support, and numerous other functions. The scope of their command requires commanders lead the people executing these tasks and functions. To acquire this wide body of knowledge, commissioned officers are expected to move to a different base every three to four years.

This poses a problem, as every time a UPT instructor leaves for career broadening opportunities, the Air Force incurs two additional training bills. The departing instructor must attend training for a combat airframe, and the replacement pilot must relearn how to fly training aircraft. These additional training bills could be significantly reduced if warrants replaced commissioned officers as UPT instructors. The high degree of specialization, inherent to the warrant officer ranks would allow them to stay at the same location, producing new pilots, for the entirety of their 10-year service commitment. A warrant officer instructor serving a 10-year assignment would eliminate six to eight training requirements for commissioned officers subject to a three-year assignment cycle. While the initial two-year training investment to create a UPT instructor is the same for commissioned and warrant officers, the return on that investment is significantly higher for warrants.

Contracted instructor pilots rank slightly behind warrant officers in the competition to improve training squadron manning stability. Theoretically, so long as the Air Force maintained continuous funding, contract pilots could remain employed as UPT instructors. However, the civilian status of contract pilots carries a potential to produce hazardous problems in the UPT arena. Because contractors are civilians, they have the option to quit if the conditions of the contract become unfavorable. This exact situation occurred in 2009 at Vance Air Force Base when over 350 contracted aircraft maintainers went on strike over a dispute with the parent company that owned the contract. With the aircraft grounded, pilot training screeched to a halt. The re-

sulting pile up of students waiting to begin training caused a blockage in the pipeline that took months to resolve.[71]

To achieve a production rate of 1,600 pilots per year, the Air Force must avoid situations that prevent a steady flow in the training pipeline. If the Air Force issued contracts to individual pilots rather than selecting a parent company to provide the contracted workforce, the likelihood of a major work stoppage could be reduced but not eliminated. An individual pilot that fails to fulfill the conditions of a contract would undoubtedly be subject to monetary penalties. However, these penalties cannot guarantee that the pilot will not quit. If the civilian marketplace presents an opportunity to achieve a higher paying salary, the pilot may be enticed to accept the penalty and leave. The threat of monetary penalties pales in comparison to punishment under the Uniform Code of Military Justice for a warrant officer that is absent without leave. As such, contract pilots fall second to warrant officers in enhancing manning stability in UPT squadrons.

Finally, the PTN program and increasing FAIP assignments are the methods with the least impact toward improving instructor manning stability at UPT squadrons. Though the PTN program should theoretically produce pilots faster, and additional FAIPs would provide a self-sustained source of manning by directly training their replacements, both programs would still produce commissioned officer pilots that are subject to a three-year assignment cycle. If either of these programs were fully implemented, there would be no appreciable change in manning stability from current operations.

Impact on operational squadron manning levels. Ignoring the amount of time it takes to develop and award the contract itself, contract instructor pilots could produce a near immediate positive impact on operational squadron manning levels. Assuming the contractors are former military pilots, they would not need to undertake the year-long UPT syllabus. In all likelihood, these contractors would only need to complete the same PIT course that any new instructor to UPT attends. After graduating, they could immediately begin replacing military pilots, thereby freeing the military personnel to return to operational squadrons. Additionally, because contractors do not count against the Air Force's total end strength authorization, they do not require a one-for-one pilot swap between operational and training squadrons. Under the current structure, the net personnel gain from a change of assignment for either operational or training squadrons is zero. For each contracted UPT instructor, operational squadrons could gain an additional body.

The PTN program is the second-best method to restore operational squadrons to full manning status. The experimental program should produce pilots faster, thereby allowing them to attend follow-on training and get to opera-

tional squadrons well before a pilot is produced by the current syllabus. This is evident in the case of the test class, as they reduced the UPT graduation timeline by fifty percent in comparison with peers who followed the standard syllabus. It remains to be seen if such a drastic reduction in the PTN students' flight time will yield acceptable performance in follow-on training. If the students have no problems progressing through the next phase of training, the Air Force may decide to fully implement the program and operational squadrons may see improved manning relatively quickly. However, it is more likely that the Air Force still needs a few years to adjust the balance of flight and simulator time to guarantee consistency in the quality of pilots it produces. Regardless of how long it takes to fully implement the PTN program, there should eventually be a significant reduction in the time it takes to make a pilot and improve operational manning levels.

Warrant officers rank third regarding their ability to improve operational manning levels. Warrant officer instructor pilots would have similar benefits as contract pilots by freeing commissioned officers to return to operational squadrons. However, because a warrant officer would need to attend the full pilot training course before PIT, the process of replacing commissioned officer instructors would be delayed by an additional year in comparison with contractors. Additionally, until a sizable warrant officer instructor corps is developed, warrant officer UPT students would take training slots away from commissioned officers who otherwise would have reinforced operational squadron manning.

Lastly, additional FAIPs is the worst option to provide immediate relief to operational squadron manning shortages. First, assuming they follow the standard UPT syllabus, the production timeline is unchanged, and it would take approximately 16 months to make them useful UPT instructors. Second, similar to the problem with warrant officers as described above, the UPT training slots used to create a FAIP prevent a newly minted pilot from going to operational squadrons after graduation. Finally, following graduation, FAIPs serve a three to four-year assignment at their initial training squadron. Hence, a FAIP will not directly improve operational squadron manning until four to five years after beginning pilot training. Although, they do indirectly contribute toward solving the manning shortage in operational squadrons by training new pilots.

Quality of training. To determine which method presents the highest quality of training, an assumption is made that warrant officers, FAIPs, and contract pilots would all be instructing under the current UPT syllabus. With this in mind, since the current UPT syllabus is a time proven method of instructing aviators, all three methods have equally high potential to produce

quality pilots. There is nothing to suggest that changing the instructor's rank, or adding civilians to the instructor corps, would negatively impact the quality of graduating pilots.

The worst option regarding quality of training is the PTN program. For reasons already described, simulator time is not a perfect replicator of actual flight conditions. Students graduating with reduced flight hours will be more susceptible to airborne physiological incidents because they have less experience in the airplane. The ability to recognize, confirm, and recover from physiological degradation is only gained through previous experience with the phenomena that induced it. Before fully implementing the program, the Air Force must acknowledge that PTN graduates will join operational squadrons with less experience to counter the disorienting effects of flight. The service must be willing to accept an increased risk of aviation accidents.

Analysis

The Air Force has established a goal of increasing production from 1,200 to 1,600 pilots per year, and additional students will necessitate a corresponding increase of instructors to train them. The ceaseless pace of combat operations, in concert with a widespread pilot shortage in operational squadrons, has presented a situation where the Air Force may not be able to organically support increasing instructor manning at UPT squadrons. The objective of this paper was to determine a solution to this problem and answer the question, are warrant officers the best solution to increase UPT instructor manning, in order to achieve the overarching goal of producing 1,600 pilots per year?

		Method to Increase Pilot Production				
		Warrant Officers	**Contract Pilots**	**Additional FAIPs**	**Pilot Training Next**	
Criteria	Timeliness of Implementation	4th	2nd	1st	3rd	**Ranks**
	Personnel Cost Savings	1st	4th	2nd (Tie)	2nd (Tie)	
	Training Squadron Manning Stability	1st	2nd	3rd (Tie)	3rd (Tie)	
	Impact on Operational Squadron Manning Levels	3rd	1st	4th	2nd	
	Quality of Training	1st (Tie)	1st (Tie)	1st (Tie)	4th	

Table 2. Summary of the comparison between methods and criteria

Table 2 summarizes the results of the comparison between warrant officers and alternative methods to increase pilot production. Each method is given a rank by how well it satisfies the previously identified criteria. A simple scan of

this table reveals that no single solution to the problem exists. While warrant officers are the best option regarding personnel cost savings and training squadron manning stability, they cannot be implemented quickly and would delay operational squadrons from returning to full manning status. To put it simply, the answer to the question proposed in this paper is no. Warrant officers are not the best option to increase instructor manning at UPT squadrons; however, neither are any of the alternatives. The pilot shortage in the Air Force is a complex problem that requires a multifaceted solution.

Conclusion

In order to provide a recommendation to solve the complex problem at hand, several conclusions regarding the pilot shortage must be understood and addressed. First, with airline hiring rates projected to increase for the next decade, pilot retention will continue to decline, and the Air Force cannot delay increasing its annual pilot production. The longer the Air Force waits to implement any of the methods described in this paper, the more difficult it will become to find available instructors. Thus, filling all empty instructor positions at UPT squadrons via the quickest method possible should be first priority. The Air Force cannot afford any delays in production that result from a lack of instructors to teach students.

Second, while fully manning UPT squadrons is first priority, the Air Force must simultaneously avoid reducing operational squadron manning, since it is evident the pace of combat operations shows no signs of slowing. Maintaining constant readiness to project combat airpower is the most important obligation the Air Force owes to the American people. Reducing operational squadron manning to fill training slots puts this obligation in danger and should be avoided at all costs.

Third, contractors can provide a means to temporarily increase manpower because they are not counted against congressional limits on end strength, but this benefit may come at a high cost. Since any proposed contract must be able to compete with other employment opportunities, contract pilots are likely to be expensive. If the Air Force is inevitably going to lose pilots to the civilian sector, it might as well be willing to pay the necessary price to recruit them back as civilians to help solve the pilot production problem. However, with high expense and the potential for a contracted workforce to go on strike, any use of contract pilots should be implemented after a plan to replace them with military personnel is in place.

Fourth, the Air Force should eventually move away from the traditional practice of solely using commissioned officers as UPT instructors. Being sub-

ject to a three-year assignment cycle generates an excessive training burden for the Air Force that could easily be avoided by utilizing warrant officer instructor pilots. Warrant officers in the Army and Navy, have a proven track record of providing technical expertise and manning stability to aviation career fields, and there is no reason to suspect the Air Force would experience anything different.

Finally, with the expectation that the training aircraft fleet is not going to grow in the near future, additional students will make flight time a low-density high-demand resource. The use of advanced simulators to replace the training lost from reduced flight time, while not desirable, is a necessary reality. The Air Force should continue its research and experimentation to determine the appropriate balance between flight and simulator time.

Recommendation

With the conclusions described above, the Air Force should proceed with the following course of action to begin producing additional pilots and start chipping away at the pilot shortage. First, immediately assess how many additional UPT instructors are required, and starting with the next graduating class, give out as many FAIP assignments as necessary to fill the gaps. In a period of two to three months UPT squadrons could be fully manned. For a short period of time this would reduce the number of new pilots flowing into operational squadrons; however, it avoids the need to reassign a fully-trained operational pilot to serve as a UPT instructor.

Simultaneously, the Air Force should begin to develop and solicit contracts for civilian instructor pilots. To mitigate the potential for a major work stoppage, the contracts should be given out to individual pilots with prior military flight experience, rather than contracting a parent company to provide the work. Once accomplished, the contract pilots could begin a one-for-one replacement of military pilots, thereby freeing them to return to their primary MWS and initiate the process of restoring operational squadrons to full manning status.

As this occurs, the Air Force should continue to research the utility of warrant officers throughout every career field. Though it is impractical to generate an entirely new rank structure solely for UPT instruction, it is likely that numerous occupations across the force would benefit from the specialization provided by warrant officers. If warrant officers can provide widespread value to the force, senior Air Force leaders should work toward gaining congressional approval to reinstate the rank. Once approved, warrant officers could

begin phasing out contract pilots, thus providing extensive personnel savings and manning stability to UPT squadrons.

Finally, the PTN program has taken ambitious strides to reduce the timeline to produce a pilot and these efforts should continue. However, the PTN program needs a slight shift in focus to ensure it consistently produces high quality pilots. Going forward, the emphasis of the PTN program should not be on determining the absolute minimum amount of flight time needed to graduate, rather the focus of the program should be on maximizing flight time for each student within the constraints of limited aircraft availability, and the requirement to produce 1,600 pilots per year. Once the appropriate balance of flight and simulator time is achieved, the PTN program should be fully implemented in concert with the recommendations described above.

Notes

(All notes appear in shortened form. For full details, see the appropriate entry in the bibliography.)

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Abbreviations

AAF	Army Air Forces
ACSC	Air Command and Staff College
AETCI	Air Education and Training Command Instruction
CGO	company grade officers
CMSgt	chief master sergeant
CSAF	chief of staff of the Air Force
DOD	Department of Defense
FAIP	first assignment instructor pilot
GAO	Government Accountability Office
MWS	major weapon system
PIT	pilot instructor training
PTN	pilot training next
RPA	remotely piloted aircraft
UPT	undergraduate pilot training
USA	United States Army
USN	United States Navy

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