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IN FOCUS

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U.S. Air Force Pilot Training Transformation

U.S. military leaders have made the case to Congress that the U.S. Air Force is not producing enough pilots to meet its authorized personnel requirements (i.e., end strength). In July 2022, Air Force Vice Chief of Staff General David Allvin testified to the House Armed Services Committee that "the national pilot shortage we discussed last year continues to challenge our Air Force." He also stated that the Air Force was 1,650 pilots short of its 21,000 pilot-requirement to meet global mission demands. The FY2023 Air Force budget request included $779.6 million for flight training programs, including $15.3 million for its "Pilot Training Transformation." Pilot Training Transformation is an effort to evolve training and produce pilots more quickly through advanced technology and modern instructional techniques. This In Focus provides an overview of the Air Force pilot shortage, describes efforts to streamline pilot training, and poses select questions for Congress.

Background

In 2017, then-Air Force Chief of Staff General David Goldfein informed Congress of a growing pilot shortage. At the end of FY2017, the Air Force was 1,947 pilots short of its authorized end strength. The Air Force has two mechanisms to sustain the required number of pilots: (1) retain current pilots, and (2) recruit and train new pilots. In response to retention concerns, the Air Force initiated monetary and nonmonetary incentive programs, such as increases to the Aviator Bonus and several quality-of-life initiatives (for more information, see CRS Insight IN10776, *U.S. Air Force Pilot Shortage*). In FY2021, the pilot shortage had decreased to 1,650. However, going forward, senior Air Force officials expect civilian airline hiring to return to prepandemic rates and draw military pilots away from the service (in 2019, approximately 30% of the civilian airline pilot cadre was former military).

The Air Force has increased production of new pilots gradually since FY2017, when it trained approximately 1,160 pilots. General Allvin stated that "in FY2021, UPT programs produced 1,381 pilots—118 more than the year prior, but still 119 pilots short of the 1,500 goal." Retention issues complicate the production issue, since training new pilots requires experienced instructor pilots—the same ones civilian airlines are recruiting.

The Air Force has trained aviators via Specialized Undergraduate Pilot Training (SUPT) since 1992. SUPT is a three-phase, 55-week program consisting of classroom academics, simulator training, and flight instruction. SUPT trains students to achieve proficiency in the military aviation skills required for operational fixed and rotary-wing aircraft. Candidates first learn basic aviation skills and spend 18 flight hours operating the DA-3 aircraft in the initial flight training (IFT) course in Pueblo, CO. Following IFT, candidates move to one of the primary SUPT bases and accumulate roughly 87 flying hours and 47 simulator hours operating the T-6A, a high-performance training aircraft. After basic SUPT, candidates are divided into four training tracks for advanced SUPT: fighter/bomber track, heavy (cargo/tanker) track, heavy propeller (C-130) track, and rotary wing track. Advanced SUPT flight time varies based on the track, but each track receives 75-105 flight hours and at least 35 simulator hours. The primary SUPT bases are Vance Air Force Base, OK; Laughlin Air Force Base, TX; Columbus Air Force Base, MS; and Sheppard Air Force Base, TX. Sheppard Air Force Base is home to European-NATO Joint Jet Pilot Training (ENJJPT) and runs a slightly different variation of SUPT to accommodate foreign pilot candidates.

Pilot Training Next

In 2018, Air Education and Training Command (AETC) launched the Pilot Training Next (PTN) program in an attempt to produce more pilots in less time at a reduced cost. Located at Randolph Air Force Base, Texas, PTN explores technological and instructional innovations that may lead to changes in SUPT. In addition to experimentation, PTN and its host unit, Detachment 24, trains small groups of students using experimental syllabi. In 2018, the first class of 13 students graduated from an experimental, 24-week syllabus. Like their counterparts in SUPT, graduates receive a basic aeronautical rating and go to follow-on training in airframes like the F-35 fighter aircraft, F-16 fighter aircraft, and C-17 cargo aircraft. After three classes and 41 graduates from PTN, AETC launched Pilot Training 2.5 at the three major SUPT bases in 2022. Pilot Training 2.5 incorporated some of the technology and learning innovations developed at PTN, representing an incremental step toward the eventual replacement of SUPT with Pilot Training 3.0. In FY2021, the Air Force launched Helicopter Training Next, which trains helicopter pilots in a separate training pipeline and does not require fixed-wing flight time. This allows more fixed-wing candidates to enter SUPT and may lead to increases in overall pilot production.

Through early experimentation at PTN, senior AETC leaders have identified several core concepts that continue to guide the pilot training transformation: student-centered learning, increased student access to training content, advanced and immersive training technology, and human performance factors.

Student-Centered Learning

Former SUPT syllabi were designed for groups of students (or classes) to train on the same timeline. PTN uses a learner-centric model, enabling students to progress at different rates and allowing individualized instruction in skills for which students exhibit deficiencies. This concept

marks a structural shift from SUPT, from scheduled progression milestones for candidates toward a flexible progression timeline. Instruction is enabled by data collection software and artificial intelligence-based applications designed to assist students in identifying training tasks for self-guided learning.

Access to Training Content

Major General Wills described "seamless access" as "removing unnecessary barriers to a student's ability to train." SUPT students have access to basic study material, but most of the devices and content used for training are accessible only when students are on an Air Force base. PTN is assessing software and hardware solutions that could potentially allow students to practice and train anywhere, including on personal mobile devices. Applications and software added to government networks may pose the risk of exploitation or network attack, especially when such software is accessible on personal mobile devices.

Advanced and Immersive Training Technology

Aircraft simulators have been a key element of Air Force flight training for decades. They have ranged from simple 3-D cockpit mock-ups to motion-capable, full-vision systems that virtually recreate all phases of flight operations. Costs for these systems vary depending on type and sophistication; the Air Force T-6 trainer aircraft simulator costs roughly $3 million per unit. Traditional flight simulators require large, climate-controlled facilities; an instructor/operator to provide mission oversight; and technicians to input the mission parameters and ensure functionality for the student. Commercially available virtual reality and augmented reality systems could offer an additional training medium at a reduced cost and allow instructors to tailor both at-work and at-home training. PTN instructors argue that immersive training devices will reduce some of the burden on instructor pilots as students are able to gain repetitions in the virtual environment.

Human Performance Factors

Some analysts note that military flying imposes unique physiological and psychological demands on pilots. SUPT human performance-related training currently consists of classroom academics, high-altitude familiarization, and high-gravitational force familiarization. PTN hired cognitive performance specialists to identify deficiencies and enhance motor response, with the goal of addressing weaknesses that could otherwise prevent students from progressing in flight training. The training environment can lead to increased student stress levels and potentially affect performance and learning. PTN is experimenting with wearable biometric devices to collect and monitor physiological data, such as changes in heart rate. Through biometric monitoring during mission activities, instructors can receive feedback on stress levels that could identify training tasks that may require additional repetition or instruction.

Other Pilot Production Initiatives

The Air Force is also considering other concepts to improve pilot production. These include an accelerated training path for civil-qualified aviators; a streamlined transition for Reserve Officer Training Corps (ROTC) graduates from aviation-accredited schools; and elimination of barriers to entry (e.g., allowing candidates to use their highest composite Air Force Officer Qualifying Test score rather than the most current score) in the pilot candidate selection process. Some analysts argue that reducing barriers to entry, reliance on virtual reality, and accelerated training timelines could sacrifice pilot quality and lead to increased mishap rates.

Budget History

Recent Air Force budget activity reflects the service's efforts to increase pilot training and production. Although PTN began training students in 2018, the Air Force first requested program funding for the effort in the FY2021 budget.

- **FY2021.** $610.9 million appropriated for flight training programs, $19.6 million for Pilot Training Transformation.
- **FY2022.** $717.9 million appropriated for flight training programs, $15 million for Pilot Training Transformation.
- **FY2023.** $779.6 million requested for flight training programs, $15.3 million for Pilot Training Transformation.

Congressional Actions during the 117th Congress

The report (S.Rept. 117-39) accompanying the Senate Armed Services Committee version of the FY2022 National Defense Authorization Act (S. 2792) directed the Air Force and Navy to conduct a study on the efficacy and efficiency of their respective pilot training programs and to evaluate the quality of their graduates. The House Appropriations Committee report (H.Rept. 117-388) accompanying its version of the Department of Defense Appropriations Act, 2023 (H.R. 8236), directed the Air Force to submit a report to the committee and provide quarterly updates to the congressional appropriations committees on efforts to address the pilot shortage.

Potential Questions for Congress

Congress may consider the following questions in conducting oversight activities and reviewing future funding requests for Air Force flight training programs.

- What impact does the current shortfall in pilot production have on Air Force readiness?
- How is the Air Force ensuring quality control for pilots trained within the accelerated PTN timeline versus those completing the SUPT program?
- When does the Air Force expect to see higher production of pilots resulting from PTN?
- How can other services leverage techniques developed through PTN to improve their respective pilot training pipelines?

Patrick Parrish, National Defense Fellow
John R. Hoehn, Analyst in Military Capabilities and Programs

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