

STATEMENT OF
CAPTAIN TIM CANOLL, PRESIDENT
AIR LINE PILOTS ASSOCIATION, INTERNATIONAL
BEFORE THE
COMMITTEE ON SMALL BUSINESS
& ENTREPRENURSHIP
U.S. SENATE
WASHINGTON, D.C.

UP IN THE AIR: EXAMINING THE COMMERCIAL
APPLICATIONS OF UNMANNED AIRCRAFT FOR SMALL
BUSINESSES

MARCH 10, 2016

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THE IMPACTS OF FAA'S DRONE REGULATIONS ON SMALL BUSINESS

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The Air Line Pilots Association, International (ALPA) is the largest professional association representing airline pilots in the world, and represents over 52,000 pilots at 30 U.S. and Canadian airlines. Thank you for the opportunity to provide our perspective on the critical importance of safely integrating unmanned aircraft systems (UAS) into the U.S. national airspace system (NAS). The North American NAS is the most dynamic and diverse such system in the world. The remarks we submit to the committee today reflect a perspective that ALPA has maintained for quite some time. ALPA fully supports the safe integration of UAS operations into the NAS. This is not a new issue and our support for the future of UAS in the NAS, as well as our perspective on the issues associated with the safe integration, are reflected in this statement.

The safety of the NAS must be maintained to deliver the safest and most efficient air transportation services in the world. Although our focus today is the North America NAS, we must point out that the safety issues highlighted are independent of any national airspace boundary and are faced by ALPA's pilots as we operate around the globe.

Small businesses are also an important part of the UAS dialogue.

Small businesses have emerged whose focus is on the sale of UAS for commercial and recreational use, and commercial operations. Innovative small-business owners appear to be identifying many potentially beneficial uses of UAS, and are seeking FAA approval to fly UAS for any number of reasons. We also recognize that agricultural use of UAS aircraft for crop inspection and other uses are increasing. As in many other industries, small businesses are also developing innovative technologies and capabilities that can ensure safe integration of UAS into the airspace. So the small-business opportunities associated with UAS aircraft are broad and growing. We appreciate the committee's efforts to bring focus on this important subject.

UAS Risk Must Be Effectively Managed to Realize Benefits

ALPA recognizes that UAS represent a significant potential for economic and societal benefit. They are uniquely suited for performing many types of specialized flying that can keep pilots out of harm's way. ALPA supports robust development of this technology with one single overriding condition: integration of UAS into the NAS must be done safely, deliberately, thoughtfully, with full understanding of the possible risks also being introduced, and most importantly—with simultaneous development of effective mitigations for those risks. We have to do this right, or the enviable safety record we have achieved in airline operations will be at risk, and with it, the promise of employing UAS for the benefit of the population.

As we have for many years, ALPA continues to be an active partner with both government and industry in developing policies, regulations, and standards that will

lead to safe operation of UAS in the NAS. But that work is far from complete. Defining a safety framework for any new technology is a necessary process, and ALPA, along with hundreds of extremely talented representatives from across aviation, is diligently pursuing that goal.

FAA Addresses Commercial Small UAS Operations

Small businesses typically operate UAS that are categorized as small UAS (under 55 pounds), or “sUAS,” so much of our focus today is on the subject of regulating that segment of the industry. The FAA has taken meaningful steps to allow sUAS to begin operating in the airspace system with multiple restrictions intended to mitigate risk.

The FAA has established a process of sUAS operational approval for commercial operations on a case-by-case basis. This is often referred to as the “Section 333 process” because the FAA’s use of this strategy is based on that section of the most recent FAA authorization. The FAA has issued more than 3,800 Section 333 approvals. For some of the approvals, the FAA has asked for public comments on whether the public has concerns with the applicant’s operation.

ALPA has submitted comments on varying issues associated with the applicants’ intended operations. From a safety perspective, our primary concern is that the applicants for a Section 333 approval cannot provide adequate details that give ALPA the assurance that the UAS will behave predictably at all times, and that should something go wrong, adequate redundancies and protections are in place to ensure that the UAS does not somehow blunder into airspace where commercial airliners are

operating, or crash back to the ground and injure innocent bystanders and/or damage property on the ground. Part of our concern is that neither the FAA nor the applicant for the Section 333 approval provides the public with adequate data or justification to mitigate existing safety regulations that have been established by the FAA for manned aircraft operations.

In addition to the interim approval process, the FAA published a notice of proposed rulemaking (NPRM) on February 23, 2015, that addressed the commercial operations of sUAS. The NPRM, which was significantly based on the FAA's 2009 recommendations of the Small UAS Aviation Rulemaking Committee, established a proposed framework for commercial operators to operate their sUAS. The NPRM formally established the definition of a sUAS, established pilot qualifications, and created operational limitations.

The FAA is now reconciling ALPA's comments along with more than 4,000 others, and have said they will issue a final rule in the coming few months. Between the Section 333 process and the eventual sUAS rule, small-business operators who desire to use sUAS as commercial operators are well on their way to having a defined path for approved NAS operations and a path for expansion of operations while ensuring safety.

Many Say the FAA Needs to Accelerate Broad sUAS Approval Policy, but ALPA Has Concerns

In testimony and in public statements, UAS manufacturers, operators, and associations have described the current state of UAS regulations as highly restrictive and changes are moving at a slow pace. They have said that it's unacceptable that small businesses have

to wait to get an exemption to the current UAS rules by the FAA in order to operate legally. There is a strong desire by many to see the integration of UAS proceed without further delays by asking Congress and the FAA to expeditiously adopt rules for UAS operations or allow unrestricted access.

ALPA has steadfastly participated in all UAS activities available. This includes rulemaking committees, standards committees, and advisory groups. ALPA has consistently taken the position that the efficient development of UAS has many benefits and should be supported. However, ALPA has also consistently maintained that the technology must be thoroughly evaluated to be understood, potential failures must be identified and mitigated, and there must be a proven safety case for the intended operations before they can be introduced into the comprehensive system of safety and operational requirements that exists in today's public airspace. This does not happen quickly, and it must be methodical to ensure the continued safety of the national airspace system.

Accelerating UAS implementation also adds risk that the benefits of public review and comment of proposed policies, rules, and standards would be shortchanged or eliminated altogether. With more than 50 years of involvement in the development of safety-based regulations, design standards, and operational implementation, ALPA can say with confidence that efforts to introduce technology prematurely into the aviation industry, before the data-driven safety analysis and review is accomplished, adds significant risk. In many cases, that risk far outweighs the benefits.

ALPA will continue to devote the necessary resources to ensure that we can bring decades of experience to the table, for the deliberation and dialogue with our government and industry peers. We believe that the pace of progress will continue to be driven by the maturity of the necessary technologies, as well as the quality and quantity of the data available for industry to analyze and endorse, not by financial or staff resource shortfalls.

Recent FAA Incident Report Data Outlines the Safety Issues that Must be Addressed

In August 2015, the FAA published a list of pilot reports on UAS encounters. ALPA reviewed the 764 events, which cover only the period from November 2014 through August 2015. Both the volume of events and many of the event descriptions are sobering reminders to the industry that the risk of a collision between a UAS and an airline aircraft has increased significantly. Consider these sample summaries (ALPA paraphrase):

Louisiana

- Baton Rouge, LA. Baton Rouge air traffic control tower reported that a regional jet on final approach to the Baton Rouge airport observed a UAS at 500 feet in height and 1 mile from runway.

New Hampshire

- Manchester, NH. The Manchester air traffic control tower received a report from a regional jet of a black and white four-propeller UAS hovering at 2,800 feet, about 7.5 miles northeast of the airport.

It is clear that hundreds of near mid-air collisions of UAS over such a short time frame far exceeds an acceptable level of risk to manned aircraft in the NAS. Undoubtedly there will be many perspectives and opinions on what constitutes an acceptable level of risk. If the FAA UAS event data tallied 100 instead of 764, ALPA would still insist that there are too many unexpected encounters.

Instead of discussing subjective opinions on the risk that UAS pose on manned aircraft, ALPA suggests that the FAA invite ALPA and others in the industry to work collaboratively to reach an agreement on the level of risk that is deemed acceptable, and then work to implement solutions to achieve the targeted risk levels. The rate of UAS encounters needs to be reversed. ALPA continues to promote UAS safety through our partnership in the “Know Before You Fly” initiative, through direct member communications, and through participation on numerous rulemaking and standards bodies as established by the FAA.

Noncommercial and Recreational UAS Operations Appear to Be a Major Source of Reported UAS Events

Although the FAA has made progress in attempting to educate noncommercial and/or hobby users as to the safe operation of their aircraft through its “Know Before You Fly” campaign, no regulations exist that govern the operation of the aircraft or the training and experience of the pilots. ALPA believes that the vast majority of the many “close encounters” with unmanned aircraft reported by airline flight crews are the result of users who either do not understand the potential severity of operating near airports and

aircraft, or are completely unaware that they are doing so. The massive growth of this segment has clearly outpaced the FAA's ability to effect safety standards that apply to it, yet the FAA remains responsible for the safety of all operations in the airspace. This significant gap must be addressed. The FAA must have the ability to ensure the safety of the NAS regardless of the types of unmanned operations being conducted, and it must have the resources necessary to act on that mandate. As we have said before, we simply cannot afford to quantify this hazard by analyzing the damage after an unmanned system collides with an airliner.

The FAA Needs to Address All UAS Uses

In order for small businesses to leverage the full potential of UAS, a comprehensive regulatory framework is needed. The standards for some of the key capabilities of UAS, and the recommendations for the wide variety of rules that must be changed or developed to accommodate large UAS, are still years away. As a result, for the foreseeable future and without additional FAA action, there will be no rules for the following UAS operations:

- Noncommercial operations by companies (e.g., pipeline or power line patrol by company employees)
- Recreational/hobbyist operating small and large UAS
- Large commercial UAS

ALPA recognizes that the commercial operations of large UAS are not developing as quickly as sUAS used for commercial, recreational, or corporate operations. The FAA

presently has rulemaking under way that addresses only one of these four types of UAS operations. The tremendous growth of sUAS in just the last 24 months when measured against the limited rules that the FAA has under way is inconsistent with the needs of the country for safe integration of UAS.

UAS Design: UAS Frangibility Is Questionable and Untested

ALPA is concerned about the impact of sUAS on an airline aircraft in the event of a collision. There are numerous videos of UAS crashes online; in many cases the crashes occur without major damage to the camera and the visible parts of the sUAS. It appears that the sUAS are generally designed to be relatively rugged, as one would expect for a commercially viable product. This ruggedness, however, needs to be evaluated in the context of the potential damage that a sUAS would impose on an airline aircraft should the two collide. We frequently hear the comment that most sUAS are small, lightweight, plastic aircraft. While this is the case for the sUAS airframe itself, the multiple propulsion units, batteries, and on-board cameras are hard metal with a significant density that a bird, for instance, does not have.

Airplane engines, windscreens, and other components may suffer the impact of such material without resulting in loss of the aircraft, but the damage would be nevertheless significant. Jet engines, for example, are notoriously susceptible to foreign object damage (FOD) typically caused by small, hard objects found all over airports—nuts, bolts, rocks, tools, etc. Damage of this type, while rarely noted in conjunction with an accident, costs the industry billions of dollars every year.

Similarly, we have seen just in the past few months the extensive damage done to an aircraft in flight by hail, shattering both pilots' windscreens and severely damaging every part of the airplane that was hit. Here again, catastrophe was averted by the robustness of the airplane design and the skill of the flight crew, but the seriousness of striking hard objects in flight was clearly illustrated. Based on our experience with FOD, hail, and other objects striking transport aircraft, ALPA recommends design evaluations, modeling, and testing the collision impact of some of the more popular sUAS.

UAS Conspicuity—Data Suggests That They Are Difficult to See Until Very Close

ALPA is frequently asked to explain how visible a sUAS is to a flight crew of an airline aircraft. There are medical studies about the limits of human visual acuity and some limited study data on distances at which a pilot perceives other aircraft. However, because UAS can be of essentially an infinite variety of sizes, shapes, and colors, studies regarding traditional aircraft do not provide a good guide. Factors such as size, shape, contrast with background, and movement relative to the observer all complicate a pilot's ability to see a UAS until it is extremely close and often too late to safely take evasive action. It is important to note that, from a safety perspective, a pilot simply seeing an object in the airspace is only part of the process. The object must be seen with enough clarity and at such a distance that a pilot has the ability to identify it and determine if evasive maneuvering is necessary to avoid a collision. To our knowledge, no specific quantifiable data on observing UAS from an aircraft moving nearly 200 mph in time to avoid collision exist.

Airline Encounters with UAS: Geographical and Altitude Limiting Technology for UAS

Technology exists to limit the geographical and vertical limits of unmanned aircraft operations, independent of the performance capability of the aircraft itself. This feature should be required for all UAS that are not intended to “mix” with conventional aircraft or in the vicinity of airports and other sensitive areas, regardless of whether the UAS is flown for business or recreation. Until the FAA mandates the use of such technology, the effectiveness of this solution will be somewhat limited.

Unfortunately, a geographical and vertical fencing would likely be subject to hackers, or those intent on defying the regulations. Attempts to defeat such technology must be viewed as a deliberate act intended to create a hazard in the NAS and dealt with accordingly. Intentionally operating any aircraft, whether manned or unmanned, in an unsafe manner is not a hazard to be mitigated—it is a deliberately unsafe act that, like intentionally shining a laser at an aircraft, cannot be tolerated and must result in an appropriate civil and/or criminal penalty.

ALPA’s View on UAS Design, Certification, and Operations

The pressure for rapid integration of UAS into the NAS must not result in incomplete safety analyses or technologies prior to any authorization approvals to operate. The urgency to allow UAS into the NAS with immature technologies and lack of appropriate standards and certifications at this time should not encumber other NAS users with additional safety burdens. Standards and technologies for UAS must be in place to

ensure the same high level of safety as is currently present in the NAS before a UAS can be authorized to occupy the same airspace as airlines, or operate in areas where UAS might inadvertently stray into airspace used by commercial flights. It is critical that the decisions being made about UAS airworthiness and operational requirements fully address safety implications and complete interoperability functionalities (e.g., detect-and-avoid capability) of these aircraft flying in, around, or over the same airspace as manned aircraft or, more importantly, airline aircraft.

A well-trained and experienced pilot is the most important safety component of the airline system. The role of the pilot is a major area of concern within the UAS—and within the piloted-aircraft communities. UAS pilots should not be allowed to operate UAS commercially using nonlicensed or private pilots.

It is impossible for a UAS pilot to react to anything other than an explicitly annunciated malfunction. Conversely, a pilot on board an aircraft can see, feel, smell, and hear many indications of an impending problem and begin to formulate a course of action before even sophisticated sensors and indicators provide positive indications of trouble. This capability is necessarily lost without a pilot on board, so the margin of safety the pilot represents must be replaced by other means. UAS pilots should be trained, qualified, and monitored to meet the equivalent standards of pilots who operate manned aircraft in either private or commercial operations.

ALPA Recommendations Pertaining to UAS Design and Operations

1. Just like manned aircraft, a comprehensive, proactive UAS integration program should incorporate consensus technology standards, safety analyses, certifications, and flight standards to ensure that introduction of UAS into the NAS will not degrade the existing NAS target level of safety.
2. Federal aviation regulations that specifically address UAS operators, operations, aircraft, and pilots must be developed. Any UAS-unique or UAS-specific regulations must be comparable and compatible with other existing regulations for other airspace users.
3. UAS are inherently different from manned aircraft and should be required to be equipped with safety-based technologies designed with both well-clear and active collision-avoidance functionalities at the heart of their system architectures to operate in normal and abnormal modes and conditions to maintain the current level of safety in the NAS.
4. Commercially operated UAS should be flown by pilots who hold a commercial certificate and an instrument rating to ensure the continuity of safety that now exists in the NAS. Every form of transportation in the United States—marine, rail, roads, and air—requires commercial licenses for commercial operations. Commercial UAS operations should be no different.
5. Any person or persons in direct control of a UAS must be limited to the control of a single aircraft unless operations are conducted in special-use airspace.

Near-Term Call for Action: A Four-Part Solution

ALPA believes that a significant step toward the eventual solution to safely integrating UAS into the NAS includes four fundamental elements:

1. *Education:* Anyone who plans to fly UAS must understand the aircraft, the airspace, and the other aircraft that could be encountered while flying.

In the case of UAS that might be commercially flown for compensation or hire, the pilot must hold a commercial pilot certificate to ensure that he or she possesses the appropriate skill and experience to meet safety standards designed to protect the flying public.

Those flying UAS for recreational purposes must adhere to the FAA guidelines, keeping the UAS within line of sight, at heights under 500 feet, away from airports.

ALPA urges Congress to provide definitive authority and remove any ambiguity about the extent to which the FAA has the authority to regulate sUAS operated for recreation, modeling, and hobby. However, in the absence of congressional clarification, we believe the FAA may be able to utilize its authority to ensure the safety of the NAS by regulating all aircraft operations. ALPA stands ready to assist the agency in the swift development of these regulations and help achieve our shared goal of ensuring the safety of air transportation.

Based on what the FAA has documented to date, the ongoing educational efforts under way by the FAA and recreational UAS segment are woefully inadequate.

Near-term action: With warmer weather on the horizon, sUAS operations will likely increase. ALPA recommends that the FAA develop an outreach initiative, encouraging manufacturers, businesses, and volunteer organizations with a vested interest in safe UAS operations to aggressively promote safe UAS operations, which include avoiding encounters with airline aircraft.

2. *Registration:* ALPA endorsed the FAA's rapid implementation of a UAS registration requirement for all but the smallest aircraft. Gathering basic information about the identity of the individual purchasing the UAS not only allows law enforcement authorities to identify the owner if the UAS were to encounter a problem, but it helps make clear the serious nature of operating a UAS in the NAS and the responsibility to safeguard public safety.

Near-term action: ALPA recommends that the FAA implement registration of UAS at the point of sale. Except for a small number of home-built UAS, this method will ensure the greatest possible compliance with the registration requirements.

3. *Technology:* If UAS are operated either intentionally or unintentionally in airspace that airliners use, airline pilots need to be able to see them on cockpit displays, controllers need the ability to see them on their radar scopes, and UAS must be equipped with active technologies that ensure that the UAS is capable of

avoiding collision with manned aircraft. In these types of operations, technology must enable the pilots to control and interact with them in the same manner as if the pilot were on board.

If a UAS is restricted by regulations from operating in a particular geographic area and/or altitude, it must have technology that cannot be overridden that limits the geographic areas and altitude in which it can operate. This may include permanent locations such as the White House and all public airports, as well as temporary restrictions such as for wildfires or natural disaster areas.

Near-term action: The FAA should expand its ongoing evaluation of technologies that are capable of identifying UAS and operator locations. The FAA should ensure that resources for the remainder of FY 2016 are adequate for the development of UAS-centric collision-avoidance technologies, with standards in place for their adoption in FY 2017.

4. *Penalties and enforcement:* UAS pilots must be properly trained and understand the consequences of possible malfunctions. Anyone flying a UAS that is a hazard to other aircraft in the airspace, especially those who choose to do so recklessly near airports, must be identified and appropriately prosecuted. We support the criminalizing of intentionally unsafe operation of UAS and penalties for unintentional unsafe UAS operations. If additional funding is needed for this purpose, Congress should provide the resources needed without delay.

Near-term action: If the FAA intends to rely on first responders to ensure UAS regulatory compliance, the FAA should better inform local, regional, state, and national law-enforcement officials. Providing law-enforcement officials with information that defines unlawful operations, provides peer-to-peer contact information, clarifies their regulatory authority, and other pertinent information is critical for an effective use of first responders to ensure UAS regulatory compliance.

Conclusions

ALPA supports the ongoing efforts to safely integrate UAS into the North American airspace system, and we realize that UAS create many important opportunities to small businesses. However, the integration needs to be done so in a way that ensures that aviation safety is not compromised and so that the target level of safety for commercial air travel in the NAS is proactively, not reactively, protected. We are fully aware that there is a strong desire by UAS proponents, and those who wish to become operators, to begin flying in the NAS as quickly as possible. Clearly, there are commercial, social, business, and international competitive advantages to a strong UAS industry. However, government and industry must take a longer view of this present state of technology to ensure that robust safety systems, in tandem with FAA-certified redundant systems of UAS, are developed that completely integrate with commercial airline operations and, above all, do so safely. An imprudent rush to create and implement minimum standards

will not only harm safety, but potentially produce a setback for the future expansion of UAS operations for years to come.

On behalf of the more than 52,000 pilots whose top priority is safe transportation, we thank the committee for the opportunity to testify on this important subject and look forward to working together to ensure the safety of our air transportation system.