Aircraft Flight Testing Preparation and Legalities

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December 3^{rd}, 2014

I Introduction

The purpose of this user story is to research the legal procedures and restrictions for flying an RC plane outside of campus. This will be done by researching precedent on the FAA's website for RC regulations, and examining insurance options through the Academy of Model Aeronautics (AMA) and through the University's Office of Risk Management. The goal is to assure that the lab operates above board and all possibilities are accounted for in the event of the craft damaging its self or others. This research will prepare the lab for the regulations relating to flying an Autonomous craft in the future.

II User Story Goals and Definition of Done

- Discuss with Chris Lum before starting this story.
- Research the Academy of Model Aeronautics policy on flying with an auto-pilot system (AMA, http://www.modelaircraft.org/). Some questions to answer include but are not limited to
  - Does liability insurance cover a system that is being controlled by an auto pilot system?
  - What are the specific rules and regulations of flying with this system?
- Research the flight operations of other universities of academic entities. Some questions to answer include but are not limited to
  - How do they log system activity (service log, flight log, combination, etc)?
  - How do they handle maintenance of the system?
  - Is there a designated pilot?
  - Who is liable for accidents?
  - What is the process they employ for taking the system out to fly (checklists, etc.)
  - Do they carry independent insurance?

- Read documents located at https://www.faa.gov/uas/regulations_policies/
- Investigate the following websites and assess the validity/credibility of the sites
  - http://dronelawjournal.com/
  - https://www.youtube.com/watch?v=6ZjwgSwXfMQ&list=UUJfdBErVr7q8xoeYanwdniA
  - link about stadiums and raceways
- Compile all your findings into a coherent document (including references and hyperlinks to your sources).
- Create a field documentation package which consists of all documentation, regulations, rules, laws, etc. that we can take with us on flight tests. This can be used to refer to in case we encounter any bystanders or civilians who are challenging the legality of our operation.
- Review FAAs draft small UAS rule (this may not be public information yet)
- Present findings to research group.

III AMA Regulations on Flying with Autopilot

AMA Liability Insurance covers flight done with autopilot with certain restrictions. These include, but are not limited to, the following:

- VLOS (of the operator) must be maintained at all times including programmed autopilot waypoint flight
- Pilot must be able to instantaneously resume manual control of aircraft
- Aircraft must be flown at or below 400 ft when within 3 miles of an airport.
- Limit of 15lbs and 70mph when using waypoint flying.

Additional Restrictions can be found in the attached AMA Document #560.

IV Policies of Other Academic Entities

An interview was conducted with James Mack and Eric Frew of US Boulder's Research and Engineering Center for Unmanned Vehicles (RECUV). The following information comes from the interview.

Legalities

Their team size consists of six people, with one full time professional. At minimum, they have a designated pilot with a professional pilot's license, an Observer with Medical FAA Second Class certification, and a second operator on autopilot. There are two levels of COA application with regards to pilot license requirement.

COAs are submitted for the aircraft at the flight ranges in which they fly, three months in advance. The FAA doesn't care as much about which activities are done, they care mostly about the aircraft its self and the test site.

COAs aren't needed for purely recreational purposes, such as a school sanctioned club, but as soon as research is done with the data gathered by a class or a lab, a COA is now required. For COA approval, they recommend thinking through and preparing for, all the ways that the system can break, what to do if the autopilot malfunctions and loses communication. A flight termination system is recommended, such as a multiplexer for autopilot (on 900MHz) and an RC command (2.4 GHz.)

The UC Boulder office of risk management covers insurance liability. They are only interested in whether or not what is done is legal.

Procedure

Their procedure is to pick an aircraft platform, and as long as the avionics are table, the FAA doesn't care about payload. They then submit their COA, of which the staff guides the process but students tackle the majority of the application. They get help from aviation professional with relevant backgrounds. The only use one person to interface with the FAA to get their universities COAs. They recommend that this person be staff, not a student. While the COA is being processed, development is performed: software in the loop simulation, payload integration, etc. HAM licenses are also required for certain radio channels. They have no formal training program.

Flight Sites

Their flight sites include Table Mountain, which is a department of commerce radio quiet zone, the Pawnee national grasslands which is federal land that has public roads and is not restricted. They also have a COA to fly over a small town, although they needed to justify safety to get it. They recommend finding a site that can be secured, away from major roads. While they have used model aircraft sites in the past, it is not ideal.

V FAA UAS Documents

The FAA has interesting things to say about an academic institution flying a aircraft, either manned or unmanned, which can generally all be summarized into the following: An academic institution can only operate an aircraft for research purposes and with a COA. The research purposes must specifically be of an aerospace nature. In an example provided, a UAS created for the purpose of monitoring a crop field is not "aerospace research," it would be agriculture research. Education and UAS training are not valid operations for COA application. According to a June 13th memo "For UAS, we interpret [aeronautical research] as research and testing of the aircraft themselves, the control systems, equipment that is part of the aircraft (such as sensors), flight profiles, or development of specific functions and capabilities for them. " This memo, as well as two other relevant memos, are attached at the end of this document. The third memo states that all required documents may be kept at a control station, or accessible to the pilot of an unmanned craft, instead of having to be on the craft its self.

VI Website Reviews

www.dronelawjournal.com

This website is operated by an attorney who is also a licensed commercial helicopter pilot and RC UAS hobbyist. While he does seem to have an agenda that isn't incredibly pro-FAA...

"On February 14, 2014, I sent FAA Administrator Huerta a copy of a drone-taken photo of my fire flight, and have offered to sell it to the FAA for $1.00. Despite having blatantly attempted to engage in commercial use with my drone to the FAA itself, I have received no response and I doubt I ever will. The FAA knows full well it has no power whatsoever to regulate drone operations, and that its claim that it does are false. However it wont confront those, like myself who confront it. Rather it resorts to sending fake cease and desist letters that prey upon those who fear the wrath of a federal agency or the cost involved in fighting it."

...his website nonetheless seems to be a good source of legal news relevant to UAS. His interpretations of FAA policies will be biased, which is important to keep in mind. This is not a good source for AFSL policy making.

Flight Plan: Charting a Course for Drones in Washington

The video has interesting information about local UAS issues, lawmakers who are interested in legislating the technology, and local businesses. Some interviewees occasionally get a little fear-

mongerish (i.e. “What if the drone can see my security system through my skylights?” and similar sentiments) but is generally fair on UAS technology.

The video covers Insitu’s military drone connections as well as their ecological UAS uses, such as the mudslide in Oso and Antarctic research. It also talks about Aerovel and other local UAs companies. It also discusses police use of unmanned systems. It then goes on to talk about legislature at the WA state level, where all UAS for state use have been grounded, before going on to federal use of the systems, which have been used in Washington State for several years for wildlife monitoring.

Academy of Model Aeronautics
AMA Advanced Flight Systems Committee
amaflightsystems@gmail.com

Radio Controlled Model Aircraft Operation Utilizing Failsafe, Stabilization and Autopilot Systems

1. DEFINITION OF TERMS:

Please refer to Page 3, section 7 which contains an alphabetical listing of the definitions of the terms in italics that are used in this document.

2. GENERAL:

All model aircraft flights utilizing *stabilization* and *autopilot* control systems must be conducted in accordance with AMA's current National Model Aircraft Safety Code and any additional rules specific to a flying site/location.

3. OPERATIONS – REQUIREMENTS – LIMITATIONS:

a) AMA members flying radio controlled model aircraft equipped with flight *stabilization* and *autopilot* systems must maintain *VLOS* with the aircraft at all times including programmed autopilot waypoint flight.

b) *AMA Pilots* must be able to instantaneously deactivate programmed flight of *autopilot systems* at any time during flight and resume manual control of the model aircraft.

c) *AMA Pilots* must perform an *R/C Test Flight* of a model aircraft before activating a newly installed *autopilot* or *stabilization system* and/or after any repairs or replacement of model aircraft *essential flight systems*.

d) Model aircraft exceeding 15lbs and/or 70mph may only use an *autopilot* for a programmed "return to launch" (RTL) flight and not for programmed waypoint flying of a predetermined course.

e) STABILIZATION & AUTOPILOT SYSTEMS MAY BE USED FOR/TO:

- Stabilization/automatically stabilize aircraft to level flight when control sticks are centered.
- Recovery/activate TRX switch to recover an out of control aircraft to level flight.
- Heading/activate TRX switch to hold a model aircraft's heading for precision flight path.
- Altitude/activate TRX switch to maintain fixed aircraft altitude while allowing directional control.
- Return GPS/activate TRX switch to return aircraft via GPS to launch point.
- Return FSS/failsafe activated from radio signal loss to return aircraft via GPS to launch point.
- Fixed circle/activate TRX switch to circle aircraft at point of activation at fixed altitude.
- Waypoint/activate TRX switch to initiate an autopilot programmed flight path via waypoints.
- Fencing/autopilot programed to display site unique boundaries on video monitor/goggles.

4. RANGE – ALTITUDE – WEIGHT – SPEED:

a) One of the requirements in Federal Law (Public Law 112-95 Sec 336 (c) (2) February 14, 2012) for model aircraft to be excluded from FAA regulations is that model aircraft be flown within *VLOS* of the operator.

b) Model aircraft must be flown at or below 400 feet AGL when within 3 miles of an airport as stated in the AMA Safety Code.

c) Model aircraft utilizing an *autopilot* for waypoint flying are limited to a maximum weight (including fuel, batteries, and onboard *autopilot systems*) of 15lbs and a speed of 70mph.

5. RECOMMENDATIONS & INFORMATION:

a) If your radio system lacks *failsafe* capability, consider using programmable digital servos or auxiliary *failsafe* modules. In the event of a radio signal failure these components will activate desired safe servo settings or an *autopilot* for return to base/launch (RTL).

b) When using an *autopilot system* the "return to launch" (RTL) feature should be programmed to return the aircraft to a safe location and safely terminate the flight should manual control of the aircraft be lost. When using RTL, pay particular attention to the manufacturer's throttle recommendations to prevent stalling.

c) The use of *stabilization systems* is recommended when flying FPV to improve flight stability and video quality.

d) Pilots usually choose to incorporate *stabilization* and *autopilot systems* for model aircraft flying to enhance flight performance, correct bad tendencies of the model aircraft, maintain stability in windy weather, establish precision heading holds for takeoffs/landings, flight training for novice pilots, create a steady flight platform for cameras, and generally just to make an airplane easier and safer to fly.

e) When purchasing *stabilization* and *autopilot systems*, always try to select quality equipment from reputable dealers, ensure for compatibility with other onboard systems, and install components according to manufacturers' instructions.

6. PRIVACY PROTECTION SAFEGUARDS:

The use of imaging technology for aerial surveillance with radio control model aircraft having the capability of obtaining high-resolution photographs and/or video, or using any types of sensors, for the collection, retention, or dissemination of surveillance data or information on individuals, homes, businesses, or property at locations where there is a reasonable expectation of privacy is strictly prohibited by the AMA unless written expressed permission is obtained from the individual property owners or managers.

7. DEFINITIONS OF TERMS:

AMA Pilot is an AMA member who is capable of manually operating an R/C transmitter to control a model aircraft's flight path within its safe intended *flight envelope* without losing control or having a collision.

Autopilot Systems incorporate programmable flight *stabilization* with an altitude sensor and a GPS receiver for accurate positioning and to navigate/control a radio controlled model aircraft's flight path. Advanced systems offer software for entering navigable waypoints. The flight data waypoints may be saved to autopilot's/GPS memory for programmed flight.

Essential Flight Systems are any systems or components necessary to maintain stable flight within a model aircraft's *flight envelope*. (This includes primary R/C systems and any *stabilization* or gyros required to maintain stability and heading in certain types of model aircraft that would be uncontrollable/unstable without their use).

Failsafe Systems are designed to minimize or prevent damage and safely terminate a flight when a radio controlled model aircraft loses radio signal. Modern radio systems can be programmed to position servos to a desired control setting in the event of radio signal failure.

First Person View (FPV) refers to the operation of a radio controlled (R/C) model aircraft using an onboard camera's cockpit view to orient and control the aircraft. (AMA Document #550).

Flight Envelope is defined as the range of airspeeds, attitudes and flight maneuvers which a model aircraft can safely perform/operate for its intended use.

Non-Essential Flight Systems are any systems or components that are not necessary to maintain stable flight within the model aircraft's intended flight envelope. (This includes *autopilot* or *stabilization systems* that can be activated and deactivated in flight by the pilot without affecting manually controlled stable flight).

R/C Test Flight requires an AMA Pilot to manually operate an R/C transmitter to control a model aircraft's flight path and determine if the aircraft is capable of maintaining stable flight within its safe intended *flight envelope*.

Stabilization Systems are designed to maintain intended model aircraft flight attitudes. The pilot can install, program and/or activate a system to stabilize yaw, pitch, or roll or any one attitude or combination of attitudes. Systems are often based on rate/heading hold gyros or inertial motion sensors utilizing multi-axis gyros and accelerometers for attitude stabilization.

Visual Line of Sight (VLOS) is the distance at which the pilot is able to maintain visual contact with the aircraft and determine its orientation and attitude without enhancements other than corrective lenses.

Federal Aviation Administration

Memorandum

Date: 13 June 2014

To: James Williams, Manager, UAS Integration Office, AFS-80

From: Mark C. Bury, Assistant Chief Counsel for International Law, Legislation and Regulations, AGC-200

Prepared by: Karen L. Petronis, Senior Attorney for Regulations, AGC-210

Subject: UAS Operations by Public Universities for Aeronautical Research

This responds to your memo of March 2013 requesting clarification of allowable operations of Unmanned Aircraft Systems (UAS) by state universities authorized as operators of public aircraft. More specifically, you request a clarification of the provisions on commercial purpose and governmental function under 49 USC 40125(a)(1) and (2). In this memorandum, we are addressing the use of UAS by public universities to conduct aeronautical research.

For purposes of this analysis, we presume the following:

- UAS are aircraft and are subject to the public aircraft statute just as manned aircraft.
- Provisions of the statute regarding flight crewmembers and qualified non-crewmembers are not applied to UAS analysis.
- The statutory prohibition on compensation is interpreted broadly, based on a concept of non-competition with civil entities, and is as stated in Paragraph 10.c. the Public Aircraft Operations Advisory Circular AC 00-1.1A.[1]
- Public aircraft operations are generally not subject to the regulations in 14 CFR Chapter I except those that affect all aircraft, such as air traffic operations. Public aircraft UAS COAs are issued to provide a means to operate a UAS in accordance with 14 CFR 91.113.

The current unavailability of routine civil operation of UAS has caused a considerable rush by government entities to qualify as public aircraft operators and be the sole source for near-

[1] **What Constitutes a "Commercial Purpose" that Removes Someone from PAO Status?** In general, the FAA interprets the commercial purpose prohibition in 49 U.S.C. § 40125(a)(1) to mean that there can be no type of reimbursement to government entities for PAO, except under the one set of specific circumstances described in that section. Specific instances of whether an operation has a commercial purpose may be submitted for interpretation to the FAA Office of the Chief Counsel, International Law, Legislation, and Regulations Division (see Appendix 2). As detailed in Paragraph 8 above, a government entity may contract with a private operator (and pay that operator) to conduct a PAO on behalf of the government entity. The statutory prohibition on commercial purpose prevents a government entity from getting paid or reimbursed to operate a PAO, not for paying for contracted services.

unregulated UAS operations. In doing so, those entities may not have been aware that the window of opportunity provided by the public aircraft statute also comes with significant restrictions.

The specific question raised by your request is whether some UAS operations by a university may qualify as aeronautical research under the description of "governmental function" under § 40125, and whether the funding of such research, when made by a grant to an educational institution, rises to level of prohibited compensation to conduct a public aircraft operation.

We are not prepared to say that the use of a UAS by a governmental entity to conduct 'research' of any kind qualifies as a governmental function under § 40125, thereby allowing it to be done under a public aircraft UAS COA. The public aircraft statute's description of governmental function includes the term "aeronautical research." We do not interpret this term to encompass any research conducted using an aircraft (manned or unmanned). If Congress meant all research, that term could easily have been included without modification and would have included any research conducted by a government entity for any reason (provided it did not have a commercial purpose).

We interpret the term "aeronautical research" in a more limited sense to include research about aircraft, as the statute by its nature includes federal entities that carry on such research as their daily activities, such as the National Aeronautics and Space Administration, and the parts of the U.S. military that develop aircraft as their function. The term "aeronautical research" would have at its core the development of aircraft and systems. For UAS, we interpret the term as research and testing of the aircraft themselves, the control systems, equipment that is part of the aircraft (such as sensors), flight profiles, or development of specific functions and capabilities for them.

In our opinion, expanding the types of research that may be conducted using a public aircraft beyond the categories of aeronautical research described would not be consistent with the intent of § 40125. Therefore, a research program to design a UAS to evaluate the capabilities of an unmanned aircraft for soybean field monitoring could be considered aeronautical research, whereas using an off-the-shelf UAS – as opposed to some other available means – to monitor moisture levels in a soybean field as part of an agricultural research project would not qualify as aeronautical research.[2] If a research project does not have at its core the development of the aircraft and aircraft systems and uses, but rather focuses on the thing being observed or monitored using an aircraft, then it is not aeronautical research. Non-aviation research that incidentally uses an aircraft does not qualify as aeronautical research, and would need another governmental function before it would qualify as a public aircraft operation.

A state university with a UAS public aircraft COA could use its COA for aeronautical research if such research is the state's intended mission. The findings of the research would have to belong to the state regardless of the source of funding, including research grants from private entities. To find otherwise would mean a private entity could pay a state university to operate a public aircraft to conduct aeronautical research solely for the private entity's benefit. The provision of

[2] Similarly, using an aircraft in the day-to-day activities of an agricultural extension service, if not related to development of an aircraft, would also not qualify as a governmental function.

funding under this scenario would constitute compensation for the operation of the public aircraft. In the case of UAS, a private entity might use such a funding arrangement to enter into a partnership with a public university solely to get the benefit of the university's COA.[3]

The public aircraft statute exists to free governments from regulation, not to confer a benefit on government entities that is unavailable to civil operators. There is no new operational authority that can be read into the public aircraft statute simply because a government entity is the operator. The public aircraft statute and UAS COAs do not exist to create a loophole of exclusive operation, or allow state universities to become exclusive providers of certain aircraft operations by any entity willing to fund them as 'research.' Consideration of whether a UAS is easier, cheaper, or arguably safer than a larger manned aircraft in a given application does not factor into the analysis of whether the operation constitutes a valid public aircraft operation. Neither utility nor novelty alone create a governmental function to support the operation of a public aircraft.

Accordingly, government entities, including qualified state educational institutions, may use a UAS to conduct aeronautical research as public aircraft operations as outlined above. Such aeronautical research may be funded by a grant (without being a commercial purpose) provided that the results of the research belong to the state (university) and the research does not carry the property of another (including the entity funding the grant). Other types of research that are simply conducted using an aircraft and that do not meet one of the other functions in 49 USC 40125 (a)(2), (or a reasonable expansion of a listed function) do not qualify as public aircraft operations, and COAs should not be granted when permissible purposes are not stated as the intended use.

[3] These limitations on funding arrangements would not, however, apply if a public university or other government entity accepted grant funding to operate a civil aircraft.[3] It is only when a government entity seeks to use an unregulated public aircraft that these restrictions arise under the statute.

Federal Aviation Administration

Memorandum

Date: July 3, 2014

To: James Williams, Manager, UAS Integration Office, AFS-80

From: Mark W. Bury, Assistant Chief Counsel for International Law, Legislation and Regulations, AGC-200

Prepared by: Karen L. Petronis, Senior Attorney for Regulations, AGC-210

Subject: Operation of UAS as Public Aircraft for Educational Purposes

This responds to your memo of March 2013 asking whether a university holding a COA as a public aircraft operator may use its COA to train university students to fly UAS within the limits of the commercial purpose and governmental function provisions of the statute, 49 USC 40125(a)(1) and (2). We have determined that education is not a valid governmental function that supports the operation of an aircraft, whether manned or unmanned. Accordingly, UAS training cannot be conducted as a public aircraft operation. The plain language of the statute, its legislative history, and the FAA's own past approach all prevent us from finding that education is a governmental function. Our analysis follows.

As in our previous interpretation regarding public aircraft UAS operations, the following apply:

- Unmanned aircraft systems (UAS) are aircraft and are subject to the public aircraft statute just as manned aircraft. Our approach to manned aircraft operations applies to unmanned aircraft.
- Provisions of the statute regarding flight crewmembers and qualified non-crewmembers are not applied to UAS analysis.
- The statutory prohibition on compensation is interpreted broadly, based on a concept of non-competition with civil entities, and is as stated in the Public Aircraft Operations Advisory Circular AC 00-1.1A.[1]

[1] **What Constitutes a "Commercial Purpose" that Removes Someone from PAO Status?** In general, the FAA interprets the commercial purpose prohibition in 49 U.S.C. § 40125(a)(1) to mean that there can be no type of reimbursement to government entities for PAO, except under the one set of specific circumstances described in that section. Specific instances of whether an operation has a commercial purpose may be submitted for interpretation to the FAA Office of the Chief Counsel, International Law, Legislation, and Regulations Division (see Appendix 2). As detailed in Paragraph 8 above, a government entity may contract with a private operator (and pay that operator) to conduct a PAO on behalf of the government entity. The statutory prohibition on commercial purpose prevents a government entity from getting paid or reimbursed to operate a PAO, not for paying for contracted services.

- Public aircraft operations are generally not subject to the regulations in 14 CFR Chapter I except those that affect all aircraft, such as air traffic operations. Public aircraft UAS COAs are issued to provide a means to operate a UAS under 14 CFR 91.113.

We have previously noted that the current unavailability of routine civil operation of UAS has caused a considerable rush by government entities to qualify as public aircraft operators and be the sole source for near-unregulated UAS operations. As operators new to the public aircraft process, state institutions have been unaware that significant restrictions exist in the statute. Much of the interest has been expressed by state educational institutions seeking to become valid public aircraft operators of UAS. Dozens of public universities and colleges have applied for UAS COAs as public aircraft operators. These educational entities have been required to show that they are a qualified state government entity under paragraph (C) or (D) of 49 USC 40102(a)(41), and most of them have done so successfully.

However, the next step, assessing the reason for the operation (the governmental function), quickly becomes complex.

Section 40125(a)(2) of the statute states –

> The term "governmental function" means an activity undertaken by a government, such as national defense, intelligence missions, firefighting, search and rescue, law enforcement (including transport of prisoners, detainees, and illegal aliens), aeronautical research, or biological or geological resource management.

Since the statute does not include education as a listed government function, the question is whether that list can be rationally expanded by the FAA to include education as a valid governmental function for purposes of the operation of public aircraft. We acknowledge that the list in the referenced paragraph is not exclusive; the presence of the term "such as" indicates that other functions may qualify. But each expansion of that list must be considered for its effect on increasing the number of unregulated operations of uncertificated aircraft and a proposed function's relationship to the core needs of states to conduct the kind of government business expressed in the statute.[2] The list of functions that Congress chose may be characterized as core functions that a state must accomplish in order to operate as a state.

A state may, of course, choose to consider education at any level a governmental function for its own purposes, but a state may not expand on its own initiative the list of governmental functions in § 40125(a)(2) to include any activity it chooses as a basis for public aircraft operation. If Congress had intended the list to mean any activity, it would have used the term "any activity," rather than the term "an activity…such as" and then provide a rather restrictive list. That state and local governments provide education is such a widespread concept that it is rational to presume that if Congress meant education to be included, Congress would have done so, rather like it included law enforcement, search and rescue, firefighting and natural resource management.

[2] We have previously determined that helicopter emergency medical services qualify as part of the "search and rescue" function listed in the statute. Accordingly, government providers of HEMS may not charge for the services provided as they are presumed to be a government activity funded by a state or local government.

Nothing in the statute or its limited legislative history suggests that the FAA may authorize the broad expansion of the statute that including education would require. Instead, the more recent actions by Congress in amending the public aircraft statute have been to walk back those limits since establishing the concept in 1958. The current provisions addressing both commercial purpose and governmental function, previously part of definitions, were moved to the substantive sections as recently as 2000, and were unchanged when the statute was amended in 2008 and 2012. No change was made to the public aircraft statute when Congress recently addressed UAS operations elsewhere.

Nor would reading the statute to include education be consistent with the FAA's past approach. If the FAA now were to read a concept as broad as education into the statute, it could exponentially expand the operation of unregulated aircraft. As a concept, education is not restricted to age or curriculum, and would include aviation education such as flight schools. All manned flight schools are civil operations, and are subject to significant regulation – none use public aircraft to teach students to fly, nor would we allow uncertificated pilots operating unregulated aircraft to teach others. The same must hold true for UAS, as the statute contains no distinction in the type of aircraft used to conduct a public aircraft operation. Accordingly, we must answer in the negative your question of whether a university could, in essence, conduct a UAS flight school using its COA.

You also asked whether some limited form of education could be found governmental. It would not be defensible to include education as a governmental function but then draw artificial limits on its scope, such as the level of education being provided, the curriculum, or the aircraft that can be used. Since our agency mission is the safe operation of the national airspace, including the safe integration of UAS into it, any analysis of whether the list of governmental functions can reasonably be expanded to include education must contain a clear consideration of the overall effect that such a change would have on aviation as a whole. There is nothing in the law or its minimal legislative history to suggest that Congress intended education to be a governmental function that a state needs to carry on its business free of aviation safety regulations.

Accordingly, we are unable to conclude that §40125(a)(2) may be expanded to include education as a general governmental function. While a school at any level may validly qualify for a public aircraft UAS COA as a part of a state, operation of a public aircraft UAS is limited to one of the listed governmental functions. A COA may not be used to operate a UAS flight school, or conduct other UAS operations to provide education as part of any curriculum that does not otherwise qualify as a governmental function.

Since education is not a governmental function, we have not included any analysis of the commercial purposes term of the statute discussing what constitutes permissible funding of educational operations.

Federal Aviation Administration

Memorandum

Date: AUG -8 2014

To: John Duncan, Director, Flight Standards Service, AFS-1

From: Mark W. Bury, Assistant Chief Counsel for International Law, Legislation and Regulations, AGC-200

Prepared by: Dean E. Griffith, Attorney, AGC-220

Subject: Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station.

This memorandum addresses whether the pilot of an unmanned aircraft may keep airworthiness certificates, aircraft manuals, and aircraft registration certificates at the unmanned aircraft's ground control station and satisfy the regulatory requirements of sections 91.9(b), 91.203(a) and (b), 47.3(b)(2), and 47.31(c) of Title 14, Code of Federal Regulations. This question has been brought to our attention because of the impracticality of placing these documents on a small aircraft with no pilot on board. As discussed below, we find that the intent of these regulations is met if the pilot of the unmanned aircraft has access to these documents at the control station from which he or she is operating the aircraft.

Section 91.9(b) prohibits operation of U.S.-registered civil aircraft unless "there is available in the aircraft" an Airplane or Rotorcraft Flight Manual or other material, markings and placards. The FAA stated that the purpose of this rule is to "insure that the information is readily available to the pilot" for use during operations. *See* 40 Fed. Reg. 24665 (June 9, 1975), 37 Fed. Reg. 20022 (Sept. 23, 1972). The text of the rule and preamble to subsequent revisions of the rule confirm the intent that the pilot is to have access to the material during flight. Accordingly, we find that the intent of the rule is met if the information is maintained at the pilot's control station such that it is available to the pilot.

Section 91.203(a) prohibits operation of a civil aircraft "unless it has within it" an appropriate and current airworthiness certificate and the aircraft's registration certification. Section 91.203(b) requires that the airworthiness certificate be "displayed at the cabin or cockpit entrance so that it is legible to passengers or crew." Similarly, sections 47.3(b)(2) and 47.31(c) allow an applicant for aircraft registration to carry "in the aircraft" the second copy of the registration application as temporary authority to operate without registration. These documents demonstrate that the aircraft is appropriately certificated and registered, or is in the process of being registered. Additionally, the FAA has previously addressed the requirement to display the

airworthiness certificate and found that the regulation permits displaying the certificate so that it is only legible to the flight crew even if not legible to passengers. *See* Legal Interpretation to Leonard A. Ceruzzi, from Donald P. Byrne, Acting Assistant Chief Counsel, Regulations and Enforcement Division (Aug. 7, 1990). Accordingly, we find that maintaining these documents at the pilot's control station would meet the intent of the rule as the pilot would be able to produce the documents for his or her own information or to an FAA inspector.

We note that this memorandum is to be narrowly construed to unmanned aircraft systems and is not intended to apply to operation of manned aircraft or optionally piloted aircraft with a pilot on board.