

Patrick MacAllister
DBA, Aerial Optics
P.O Box 26
Humarock MA 02047
(781)588-3259
Patrick@aerialoptics.net

Date: January 22 2015

U. S. Department of Transportation
Docket Management System
1200 New Jersey Ave.,
SE Washington, DC 20590

RE: Patrick MacAllister DBA Aerial Optics for Exemption Pursuant to Section 333
Of the FAA Reform Act

Attn: To whom it may concern

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 C.F.R. Part 11, Patrick MacAllister DBA, Aerial Optics, owner and operator of Small Unmanned Aircraft Systems (“sUAS”) equipped to conduct aerial photography and videography, hereby applies for an exemption from the listed Federal Aviation Regulations (“FARs”) to allow commercial operation of sUAS, so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333.1

The proposed exemption, if granted, would allow Patrick MacAllister DBA, Aerial Optics to conduct commercial operations of small unmanned aircraft systems (“sUAS”) meeting or exceeding all of the operational and safety requirements Congress has set forth in Section 333. Statutory Authority Section 333, titled “Special Rules for Certain Unmanned Aircraft Systems”, provides a mechanism for seeking expedited FAA authorization of safe civil UAS operations in the NAS. Section 333(a) states that the FAA “shall determine if certain unmanned aircraft systems may operate safely in the national airspace system before completion of the (comprehensive) plan and rulemaking required by section 332(b)(1) of this Act or the guidance required by section 334 of this Act.” In Section 332(b)(1), Congress made it clear that Section 333 provides a mechanism for “expedited operation authorization” if several factors are met. Petitioner meets all requirements to permit FAA approval of commercial UAS operations.

The Petitioner Requests Relief From the following regulations:

14 C.F.R. Part 21
14 C.F.R. 45.23 (b)
14 C.F.R. 91.7 (a)
14 C.F.R. 91.119
14 C.F.R. 91.121

14 C.F.R. 91.151(a)
14 C.F.R. 91.203 (a) & (b)
14 C.F.R. 91.215
14 C.F.R. 91.405
14 C.F.R. 91.407
14 C.F.R. 91.409
14 C.F.R. 91.417
14 C.F.R. 91.109

Patrick MacAllister DBA, Aerial Optics is petitioning for exemption to enable Aerial Optics to operate a DJI F550 (6 Motor sUAS) Utilizing the DJI Naza-M V2 flight controller and a custom built 450mm waterproof quad copter (4 Motor) sUAS also utilizing the DJI Naza-M V2 flight controller. The sUASs will be equipped with cameras, camera stabilizing gimbals and OSD (on screen displays) providing the PIC with altitude, airspeed, battery life and direction. Our UAS flight controllers utilize GPS to limit the altitude above the ground and limit the radius of the distance it flies from the PIC. Our UASs have GPS guided failsafe functions allowing the autopilot system to fly back to the launch site autonomously. If the transmitter is disconnected the system will automatically trigger return to home and will land safely. Our larger UASs will be equipped with emergency parachute systems to drastically reduce damage to objects or persons on the ground in the event of a total system malfunction.

Pending FAA exemption Aerial Optics will be testing other styles of sUAS including coaxial motor configurations to aid flight characteristics in less than perfect conditions. Any new sUAS will be thoroughly tested and adhere to regulations imposed by FAA Section 333.1 and our General Operating Standards listed on page #3&4.

Please refer to the attached Naza-M V2, and DJI-F550 instruction manual for the performance limitations and flight operations.

Aerial Optics is owned and operated by Patrick MacAllister. Patrick has been in the Aviation Industry for 24 years and holds a commercial rotorcraft license as well as a current CFI (Certified flight instructor) certificate. He has flown many aerial tours and photo flights piloting manned aircraft, has over 20 years experience in remote controlled aircraft and 2 years experience building, testing and flying sUAS.

Our commercial activities would include:

- Aerial surveying
- Event photography/videography
- Real estate photography
- Aerial filmmaking and photography
- Unmanned aerial sightseeing
- Construction site inspections and monitoring
- Building inspections
- UAS training and safe operations

FCC INFORMATION

This Spektrum transmitter used for controlling the sUAS complies with part 15 of the FCC rules. Please refer to the attached Spektrum transmitter manual,

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference,
- (2) This device must accept any interference received, including interference that may cause undesired operation.

The Spektrum radio transmitter used for controlling the sUAS is wireless technology which has been tested and found to be compliant with the applicable regulations governing a radio transmitter in the 2.400GHz to 2.4835GHz frequency range.

PILOT IN COMMAND AND OBSERVER QUALIFICATIONS AND DUTIES

The PIC will maintain at least a Commercial Pilot Certificate and a current Class III medical certificate, plus at least 2 hours flying time and 3 takeoffs and landings within 30 days in the type of UAS utilized in operations. The PIC will have at least 40 hours total time and at least 20 hours flying Radio Controlled Aircraft of which will be 10 hours flying sUAS.

The PIC is responsible for the safe and efficient operation of the aircraft. Specific duties include all preflight preparation, in flight operation and post flight requirements. Procedures including but not limited to:

- Safe flight operations
- Risk assessment and mitigation to persons and property
- Site suitability

The Observer must have the visual acuity to observe the sUAS and be able to communicate clearly with the PIC utilizing hand signals, verbally or 2 way radios.

The Observers duties are;

- Notifying the PIC of any impending obstacles in the flight path of the sUAS.
- Notifying the PIC of any deviations in the planned flight path of the sUAS.
- Notifying the PIC if unauthorized persons enter the area of the planned flight.

GENERAL OPERATING STANDARDS

- Before an operation of a sUAS within 5NM of an airport with a control tower, the control tower will be called to gain permission to operate the sUAS. The PIC will give the position, altitude and the times the sUAS will be operated. The sUAS will not be

operated at an altitude of over 150 feet AGL. Weather minimums will be 3 miles visibility and a 1000 foot ceiling.

- Before an operation of a sUAS within 5NM of a non-tower controlled, airport operators will be notified and the PIC will give the right of way to avoid flying in the proximity of full-scale aircraft. At no time will the sUAS be operated within the final approach course and the takeoff course of any runway. The sUAS will not be operated at an altitude of over 200 feet AGL.
- Weather minimums will be 3 miles visibility and a 1000 foot ceiling.
- Aerial Optics will only operate its sUAS in line of sight of a PIC and/or observer and will operate at sites that are a 'sufficient distance' from populated areas. Such operations will insure that the sUAS will not create a hazard to users of the national airspace system or the public.
- All of our operations will be under 200' if we are operating within the 30mi reach of a mode c veil.
- Maximum flight time for each operational flight will be 30 minutes.
- Flights will be terminated at 25% battery power reserve should that occur prior to the 30 minute limit.
- The sUAS will be programmed so that it will not be operated at an altitude of no more than 400 feet AGL, and not more than 200 feet above an elevated platform from which filming is planned.
- Minimum crew for each operation will consist of the sUAS Pilot, and Visual Observer.
- The sUAS operated by the petitioner weighs less than 55 pounds, including the payload (i.e. camera, lens, and gimbals).
- The sUAS will operate at speeds of no more than 50 knots, can hover, and can simultaneously move vertically and horizontally.
- All operations must utilize a visual observer (VO). The VO and PIC must be able to Communicate by voice, 2 way radio or hand signals at all times during a flight operation.
- Operations will be restricted to flights over water, public or private property with the permission of the property owner(s)
- All required permits will be obtained from state and local government prior to operation.
- sUAS will not be operated over densely populated areas.
- sUAS will not be operating over any open-air assembly of people.

- sUAS will not be operating over heavily trafficked roads.
- All new to service sUAS both custom and pre-manufactured will have a minimum of 25 logged flight hours and deemed safe by the PIC prior to commercial operations.

HOW THIS REQUIST IS TO THE BETTERMENT OF OUR COMMUNITY

Our UAS are powered by batteries, smaller, lighter and more maneuverable than larger aircraft running on combustible fuel, it operates at lower altitudes with no people on board and will thereby reduce current risk levels associated with traditional aircraft, enhance safety and diminish the likelihood of death or serious bodily injury. Also with a small payload and typical flight time of only 20 minutes, there is little or no risk to national security.

Low level photos and video are far more effective than ground or high altitude manned aircraft imagery for displaying detailed characteristics of ground based objects. The applicant in the past has chartered full-sized helicopters for this purpose, which has proven more costly than many potential clients have been able to afford. The benefits of reduced cost and improved quality of presentation from the UAS will be incredibly valuable to future clients.

Aerial sightseeing will be conducted safely over coastal Massachusetts water ways and underpopulated areas. This new form of tourism will allow all individuals including children, elderly and disabled to enjoy the feeling of flight and see the area from above without the noise, danger and cost associated with traditional helicopters.

Additionally, we will make our sUAS available to first responders in our community who might require assistance, including fire fighters, police, sheriff, et al., while remaining subject to all limitations cited in this application.

EXEMPTION REQUESTS AND EQUIVALENT LEVEL OF SAFETY

Patrick MacAllister DBA Aerial Optics requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the sUAS System.

14 CFR Part 21, Airworthiness Certificates:

This part establishes the procedures for the issuance of an airworthiness certificate. While the FAA continues to work to develop airworthiness standards for Unmanned Aerial Systems, we request an experimental certificate be issued for our UAS's under either or both of the following provisions: 21.191 Experimental certificates. Experimental certificates are issued for the following purposes:

(a) *Research and development.* Testing new aircraft design concepts, new aircraft equipment, new aircraft installations, new aircraft operating techniques, or new uses for aircraft.

(b) *Showing compliance with regulations.* Conducting flight tests and other operations to show compliance with the airworthiness regulations including flights to show compliance for issuance

of type and supplemental type certificates, flights to substantiate major design changes, and flights to show compliance with the function and reliability requirements of the regulations. Since the experimental certificate can be used for commercial purposes such as market surveys, sales demonstrations, and customer crew training, we would expect that an experimental certificate would permit our commercial purpose as well. The aircraft will not carry persons or property, will not carry fuel, and will only fly under strict operational requirements. Combined with the UAS lightweight, being constructed primarily of carbon fiber and plastic in conjunction with the ability to utilize emergency parachute systems. We propose that the UAS will be at least as safe, if not safer, than a conventionally certificated aircraft performing the same mission. If an experimental airworthiness certificate is not appropriate for this application, then we request an exemption of 14 CFR Part 21, Subpart H, and the requirement for an airworthiness certificate in general, citing the equivalent level of safety outlined in the previous paragraph.

14 CFR 45.23 Display of marks; general and 45.29 Size of marks:

These regulations provide that each aircraft must display "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, the aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station. The sUAS does not have an entrance in which the word "EXPERIMENTAL" can be placed, and may not have a registration number assigned to it by the FAA. We propose to achieve an equivalent level of safety by including the word "EXPERIMENTAL" in the placard on the top of the aircraft, as shown above, where the PIC (Pilot In Control), VO (Visual Observer) and others in the vicinity of the aircraft while it is preparing for launch will be able to see the designation. Additionally, we feel that the permanent placard discussed in the previous paragraph will provide the aircraft's registration information at the ground station. Finally, we will display at the ground station a high contrast flag or banner that contains the words "Unmanned Aircraft Ground Station" in letters 3 inches high or greater. Since the aircraft will operate within 3/4 NM of the ground station, the banner should be visible to anyone that observes the aircraft and chooses to investigate its point of origin.

14 CFR 91.7 Prohibits the Operation of an aircraft without an airworthiness certificate:

As no such certificate will be applicable in the form contemplated by the FARs, this Regulation is inapplicable.

91.119 Minimum safe altitudes:

The regulation states that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. Since the typical mission of the sUAS would be photography or survey of persons, vessels, vehicles or structures it would be necessary to operate closer than 500 feet to the items listed. Operations will only be flown over property or persons where careful pre-planned flight path has been performed. In the event of a system malfunction or emergency landing with or without a deployed parachute. The hazard to persons or property on the surface will be very limited. Therefore we maintain that due to the small size of the UAS, the hazard to persons, vehicles and structures is minimal compared to manned aircraft, which should be considered in granting the exemption.

CFR 91.121 Altimeter settings:

The regulation requires that aircraft shall maintain cruising altitudes by reference to an altimeter setting available within 100 NM of the aircraft. The sUAS will always fly below 400 feet AGL and will not need to maintain cruising altitudes in order to prevent conflict with other aircraft. An Above Ground Level altimeter measurement above the takeoff point is transmitted via radio from the sUAS on-board computer to the display screen held by the PIC, providing a constantly updated AGL readout. The Naza M V2 flight controller can be configured to geo-fence the UAS under the 400' maximum altitude.

14 CFR 91.151 Fuel requirements for flight in VFR conditions:

The regulation provides that no person may begin a flight in an airplane under day-VFR conditions unless there is enough fuel to fly to the first point of intended landing and to fly after that for at least 30 minutes. The purpose of this is to provide an energy reserve as a safety buffer for delays to landing. Since the aircraft will never fly more than 3/4 NM from the point of intended landing, a full battery charge at launch will ensure that we meet the reserve energy requirement of this paragraph.

14 CFR 91.203(a) & (b) Civil aircraft: Certifications required:

The regulation provides that an airworthiness certificate, with the registration number assigned to the aircraft and a registration certificate must be aboard the aircraft. Additionally, subparagraph (b) provides that the airworthiness certificate be "displayed at the cabin or cockpit entrance so that it is legible to passengers or crew." At a maximum gross weight of 55 pounds, the sUAS is too small to carry documentation, does not have an entrance, and is not capable of carrying passengers or crew. To obtain an equivalent level of safety and meet the intent of 91.203, we propose that documents deemed appropriate for this aircraft by the FAA will be with the crew at the ground control station and available for inspection upon request. In order to identify the aircraft, we propose that the information found on airworthiness and registration certificates be permanently affixed to the aircraft via placard containing the following information plus the word "EXPERIMENTAL" to satisfy the requirement of 14 CFR 45.23.

14 CFR Subpart E (91.401- 91.417) -Maintenance, Preventive Maintenance, Alterations:

The regulation provides that the operator is primarily responsible for maintaining the aircraft in an airworthy condition, including compliance with part 39 and 43. Paragraphs 91.407 and 91.409 require that the aircraft be "approved for return to service by a person authorized under 43.7" after maintenance and inspection. It is our intention that the PIC perform maintenance and inspection of the aircraft and "be authorized to approve the aircraft for return to service." The PIC will ensure that the aircraft is in an airworthy condition prior to every flight and in addition conduct detailed inspections after every five hours of flight. All maintenance will be performed by the PIC in accordance with the manufactures manual. If required maintenance is beyond the ability of the PIC the maintenance will be performed by the manufacturer or their designated repair facility. The PIC will document work performed in accordance with 91.417. We feel that due to the size, construction, and simplicity of the aircraft, the PIC can ensure an equivalent level of safety.

14 CFR 91.109 Flight Instruction; Simulated instrument flight and certain flight tests:

The regulation states that "No person may operate a civil aircraft that is being used for flight

Instruction unless that aircraft has fully functioning dual controls." Training will be conducted by Aerial Optics we have the ability to provide dual controls utilizing two Spektrum transmitters with a wireless link between the transmitters. One transmitter is designated the master transmitter and the other transmitter is designated as a slave. The PIC instructor, utilizing the master transmitter, will be at all times be able assume control of the sUAS.

14 C.F.R. 91.215 ATC transponder and altitude reporting equipment and use:

This regulation states all aircraft operating within 30 nautical miles of class A, B and C airspace must be equipped with automatic pressure altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations. Due to the small size and lifting capabilities of our UASs we cannot carry a traditional transponder. All of our operations will be under 250' if we are operating within the 30mi reach of a mode c veil.

CONCLUSION

By granting Patrick MacAllister DBA, Aerial Optics requested exemptions, the FAA will help drive development of safe and successful commercial UAS operations and will advance the public knowledge base for such operations of UAS. Aerial Optics is committed to promoting the UAS research efforts of policymakers by sharing data from its commercial UAS operations and serving as a resource for future UAS research operations.

As pointed out in this application, all the sUASs which our company would use, under authorization by the US DOT-FAA, are small, light-weight devices operated within the line of sight of the Pilot-in-Command (PIC), less than 400 feet above the ground and outside 5 miles from any airport or location with aviation activities, unless the air traffic control authorities (ATC) have been notified and have authorized each flight within a radius of this distance.

Aerial Optics seeks an exemption pursuant to 14 C.F.R. and Section 333 of the FAA Modernization and Reform Act of 2012 (FMRA), which will permit safe operation of our UAS commercially, without an airworthiness Certificate. By granting this Petition, the FAA Administrator will be fulfilling the Congressional mandate of the FAA Modernization and Reform Act of 2012, while also advancing the interests of the public, by allowing Aerial Optics to safely, efficiently, and economically operate sUASs commercially within the NAS. Wherefore, in accordance with the Federal Aviation Regulations and the FAA Modernization and Reform Act of 2012, Section 333, Aerial Optics respectfully requests that the Administrator grant this Petition for an exemption from the requirements of 14 C.F.R Sections.

Sincerely,

Patrick MacAllister
Aerial Optics