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U.S. Department of Transportation, Docket Operations
West Building Ground Floor, Room W12-140
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Request for Exemption under Section 333 of the FAA Modernization and Reform Act, Subsection (f) of 49 U.S.C. § 44807, and 14 CFR Part 11 from 14 CFR 91.119(c); 91.121; 91.151(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b) for UAS operations over 55 pounds.

INTRODUCTION

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (FMRA), Subsection (f) of 49 U.S.C. § 44701, and 14 CFR Part 11, our client, ESPN Productions, Inc. (hereafter known as the “Petitioner”), respectfully requests approval and exemptions from the following listed Code of Federal Regulations. The purpose for this request is to operate the Freefly Systems, Inc. Alta X over 55 pounds but no more than 76.9 pounds, for controlled, low-risk, closed-set aerial cinematography operations for the television and motion picture industry. The operations will be conducted within and under the conditions outlined herein, or as may be established by the FAA, as required by Section 333 and 44701 requirements.

The proposed operation in this petition for exemption are similar in nature to those currently conducted by the Petitioner with small UAS under 14 CFR Part 107. The only difference between the operations proposed herein and the Petitioner’s existing operations under Part 107 is that the proposed operation will involve the use of UAS weighing more than 55 pounds, and therefore the operation cannot be conducted under Part 107.

As described more fully below, the requested exemption would permit the operation of the Alta X under controlled conditions in airspace that is: 1) limited; 2) predetermined; 3) controlled as to access by security personnel on a closed set. Grant of the requested exemption is in the public interest based upon the concise direction expressed within Section 333 of the FMRA; the added authority granted by the Act, as amended; an equivalent level of safety regarding flight operations as expressed herein, and significant cost savings achieved by transitioning from traditional manned aerial resources to UAS.

The Petitioner respectfully requests that the FAA grant the requested exemption without delay. Petitioner will operate the Alta X while keeping the documents required by the regulations at the ground control station and immediately accessible to the pilot in command (PIC) and by modification of the required markings (registration number) of the Alta X to be displayed on the fuselage.

The primary contact (Responsible Person) for this petition, with a copy at the address above is:

Ryan Humble
Address: 1 ESPN Plaza, Bristol, CT 06010
Telephone: (860) 766-1882

In support of this Petition for Exemption, Airspace Consulting will submit the following confidential documents on behalf of the Petitioner:

Flight Operations and Procedures Manual
Alta X Unmanned Aircraft Flight Manual
Operational Risk Assessment
PIC Training Program
VO Training Program
Motion Picture and Television Operations Manual

These documents will be submitted on a confidential basis under separate cover, pursuant to 14 CFR § 11.35(b), as the documents contain confidential commercial and proprietary information that the Petitioner has not and will not share with others. The information contained in this material is not generally available to the public and is protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq.*

UMANNED AIRCRAFT SYSTEM

The Freefly Systems Alta X is an electric multicopter aircraft designed for specifically for cinematic and industrial applications. The aircraft was designed from the ground up to be a reliable, heavy-lift platform.

The dimensions and physical characteristics of the Alta X are as follows:

Manufacturer: Freefly Systems, Inc.
Flight Controller: Auterion Custom PX4 Flight Stack
Propulsion System: DJI E7000
Utilization: Aerial Cinematography
Airframe Diameter: 56”
Airframe Height: 17”

Basic Empty Weight: 22.9 lbs.
Manufacturer Max. Takeoff Weight: 76.9 lbs.

Components and Safety Systems

DJI E7000 Propulsion System – Each of the four M12 motors and 33” propellers generate 38.8 pounds of thrust at sea level and 25 C. The power system components are weatherproof and have internal cooling for demanding applications.

Auterion Custom PX4 Flight Stack - PX4 is a professional autopilot developed by world-class developers from industry and academia. PX4 has been customized by the engineers at Auterion to enhance its safety features and reliability. PX4 is BSD-Licensed flight control software for unmanned vehicles that is utilized by some of the largest companies in the industry.

QGroundControl - provides full flight control and configuration for PX4 powered vehicles. QGroundControl features a complete and fully customizable control station for MAVLink based unmanned aircraft.

Command and Control (C2) – The TBS Crossfire transmitter and 8 channel diversity receiver always ensures positive remote control. In the extremely improbable event, the C2 connection is lost, the flight controller will immediately return the Alta X to the home launch location. The PIC may choose to resume the flight if the C2 link is established again while the Alta X is returning to the home point.

MAVLink - Micro air vehicle communication protocol is utilized for communications between the flight controller and ground control station. Should a telemetry link to the base station be lost, the Alta X has all mission parameters stored onboard, and can safely continue to execute a mission. Audio alerts on the ground control station will alert the PIC to a number of conditions with programmable parameters.

Flight Termination Switch (FTS) - A flight termination switch allows the pilot in command to instantly stop motors in the event of an emergency.

Return-to-Launch (RTL) - The operator has systems that can instantly stop the Alta X and return it to the launch point at a predetermined safe altitude. The RTL mode may be entered manually or autonomously depending on system settings.

Geofencing - The Auterion flight controller is given GPS coordinates of a boundary that it must stay within, keeping the Alta X from leaving the pre-determined and defined operations area. When enabled, the Alta X can reach the perimeter, but not fly past or through it. Manual or automatic inputs commanding the Alta X to break the geofence are dismissed.

Redundant Sensors – The flight controller is equipped with redundant microelectromechanical sensors (MEMS). If the primary MEMS experience a failure, secondary or tertiary sensors will automatically takeover as a failsafe to ensure accurate positioning and navigation is maintained.

Flight Data Recorder – The flight controller records all operator control input, GPS location information, vibration, battery voltage and all other critical telemetry data. The entire flight track can be replayed after the flight for training and troubleshooting. All flight data are automatically saved both on Alta X and the ground control station.

Safety parameters - Maximum altitude, distance from home, horizontal speed and vertical speed parameters are set in the flight controller. These parameters can be changed prior to the flight based on location and operating restrictions.

High Visibility LED Lighting - Long-range visible, high intensity LED lights are located on the ends of each boom.

Intelligent Assisted Launch and Landing – Flight controller uses GPS and IMU data to determine when the craft is fully on the ground so the aircraft will not shut rotors off until firmly on the ground. Aircraft also uses IMU data to handle flight safely and smoothly in ground effect caused by the rotor downwash, which increases safety of flight.

Rotor Stall Prevention - Flight controller prevents accidental 'throttle zero' motor stall while in the air. In an emergency, operator can switch instantly to 'manual' mode to activate rotor kill, providing complete system override by the pilot during an in-flight emergency.

10.5-second auto-lock rotors - Automatically locks rotor from accidental turning after initial power connected and again five seconds after rotors stop.

Operational Analysis and Flight Testing

The Alta X has operated successfully in extreme weather conditions to include high winds and a variety of terrains. Aircraft performed well at high altitudes and high winds, no loss of communications, no issues with stability, or control and handling. Performance of all safety features work as designed.

THE OPERATOR

ESPN Inc. is a multinational sports media conglomerate majority-owned by The Walt Disney Company. Commonly marketed as the "Worldwide Leader in Sports", programming on its television networks include broadcasts of live or tape-delayed sporting events, talk shows, and original documentary series and films.

Ryan Humble, the manager of ESPN Drone Operations, has over 6 years of experience conducting commercial UAS operations. Ryan and his team of pilots have coordinated with professional sports leagues, government agencies, universities, and local authorities to conduct commercial UAS operations on behalf of ESPN and Disney for aerial coverage of hundreds of high-profile sporting events and productions since 2019. The team is well known in the sports media world for their attention to detail and safety record. Each pilot has hundreds of logged flight hours across a wide variety of UAS models. The team also attended two days of in person training on the Alta X with Freefly.

STATUTORY CRITERIA PROVIDED IN SECTION 333

Equivalent level of safety

The Alta X weighs less than 76.9 lbs., carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured area of a closed set for television and motion picture productions. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the operator, pursuant to the criteria in the operator's manual, and under the requirements and in compliance with local public safety requirements, to provide security for the area of operation as is now done with conventional filming.

The Federal Aviation Act (49 U.S.C. § 44701 (f)) and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas. In all cases, an analysis of these criteria demonstrates that an unmanned aircraft operated without an airworthiness certificate, in the restricted environment and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed-wing or rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

As there will be no airworthiness certificate issued for the unmanned aircraft, and no FAA regulatory standard will exist for determining airworthiness of the unmanned aircraft, the requirements contained in the operator's manual for maintenance and use of safety check lists prior to each flight, will provide an equivalent level of safety.

Since there is no ability or place to carry certification and registration documents on the unmanned aircraft, an equivalent level of safety will be achieved by keeping these documents at the ground control station. Given the size of the unmanned aircraft, the FAA registration number will be displayed on the airframe in as large a font as possible.

Regulations from which the exemption is requested:

- 14 CFR § 91.119(c)
- 14 CFR § 91.121

- 14 CFR § 91.151(b)
- 14 CFR § 91.405(a)
- 14 CFR § 91.407(a)(1)
- 14 CFR § 91.409(a)(1) and (2)
- 14 CFR § 91.417(a) and (b)

14 CFR § 91.119(c): Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119(d) allows helicopters to be operated at less than the minimums prescribed, provided the person operating the helicopter complies with any route or altitudes prescribed for helicopters by the FAA. Since this exemption is for an unmanned aircraft that is a rotorcraft and the exemption requests authority to operate at altitudes up to 400 AGL, an exemption may be needed to allow such operations. As set forth herein, except for the limited conditions stated in the operating manual, the unmanned aircraft will never operate higher than 400 AGL. It will however be operated on closed sets, where non-participating people will be prohibited by security personnel, barricades, etc.

The equivalent level of safety will be achieved given the size, weight, speed of the unmanned aircraft as well as the location where it is operated. Compared to flight operations with aircraft or rotorcraft weighing far more than the maximum 76.9 lbs. proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft operating at or below 500 AGL. In addition, the low-altitude operations of the unmanned aircraft will ensure separation between them and the operations of conventional aircraft that must comply with Section 91.119.

14 CFR § 91.121: Altimeter Settings

This regulation requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "...to the elevation of the departure airport or an appropriate altimeter setting available before departure." As the UAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption may be needed. An equivalent level of safety will be achieved by the operator, pursuant to the operations manual and safety check list, confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

14 CFR § 91.151(b): Fuel Requirements for Flight in VFR Conditions

Section 91.151(b) states that "No person may begin a flight in a rotorcraft under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 20 minutes.

The battery powering the Alta X provides approximately 40 minutes of powered flight without any payload and approximately 20 minutes at 70 lbs. In order to meet the 30-minute reserve requirement in 14 C.F.R. § 91.151, flights would not be possible. Given the limitations on the Alta X's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight or night VFR conditions is reasonable.

Applicant proposes that an exemption from 14 CFR § 91.151 falls within the scope of prior exemptions. See Exemption 10673 (allowing Lockheed Martin Corporation to operate without compliance with FAR 91.151(a)). Operating the small UAS, in a tightly controlled area where only people and property owners or official representatives who have signed waivers will be allowed, with less than 30 minutes of reserve fuel, does not engender the type of risks that Section 91.151(a) was intended to alleviate given the size and speed of the small UAS.

Applicant proposes that an equivalent level of safety can be achieved by requiring flights to have at least a 25% reserve of battery power. This restriction would be more than adequate to return the Alta X to its planned landing zone from anywhere in its limited operating area. Similar exemptions have been granted to other operations, including Exemptions 2689F, 5745, 10673, and 10808

14 CFR § 91.405(a); § 407(a) (1); § 409(a)(2); § 417(a) and (b): Maintenance Inspections

These regulations require that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter..." and others shall inspect or maintain the aircraft in compliance with Part 43.

Given that these sections and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to the applicant. An equivalent level of safety will be achieved because the Alta X is limited in size and will only operate in restricted areas for limited periods of time. If mechanical issues arise the Alta X can land immediately since it will be operating from no higher than 400 feet AGL. As provided in the operations manual, the PIC will ensure that the Alta X is in a safe condition prior to initiating flight, will perform required maintenance, and will keep a log of any maintenance performed. Moreover, the operator is the person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

PUBLIC INTEREST

The use of small UAS reduces the need for low altitude flights with commercial helicopters for closed set filming. Commercial helicopter flights not only expose those on set to risk, but those who are along the path of flight associated with the arrival and departure since those aircraft must be flown to and from the site. Conventional helicopters also weigh thousands of pounds more than the Alta X and carry flammable fuels that are not carried by small, electric UAS.

FEDERAL REGISTER SUMMARY

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012, 49 U.S.C. § 44701(f), and 14 C.F.R. Part 11, the following summary is provided for publication in the FEDERAL REGISTER, should it be determined that publication is needed:

Petitioner seeks an exemption from the following rules in Title 14 of the Code of Federal Regulations: 91.7(a), 91.119(c), 91.121, 91.151(b), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), 91.417(a) and (b).

ESPN Productions, Inc. requests an exemption for the purpose of operating an unmanned aircraft system (UAS) weighing 55 pounds or more, but not more than 76.9 pounds, to provide aerial cinematography services for the television and motion picture industry.

CONCLUSION

For the foregoing reasons, ESPN Productions, Inc. respectfully requests that the FAA grant this Petition for Exemption. Should you have any questions, or if you need additional information to support the ESPN Productions, Inc. petition, please do not hesitate to contact the undersigned.

Respectfully Submitted,



Gus Calderon
Airspace Consulting