U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

September 14, 2015

Exemption No. 12837
Regulatory Docket No. FAA−2015−2000

Mr. Rob Schwarz
Remote Intelligence, LLC
953 Lake Road
Wellsboro, PA 16901

Dear Mr. Schwarz:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated May 20, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Remote Intelligence, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial surveying, photography, videography, and data collection.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner are the Prioria Maveric and Prioria Hex.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the

aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection[1]. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Remote Intelligence, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

[1] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

Conditions and Limitations

In this grant of exemption, Remote Intelligence, LLC is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the Prioria Maveric and Prioria Hex when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents,

the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS−80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

24. The UA must remain clear and give way to all manned aviation operations and activities at all times.

25. The UAS may not be operated by the PIC from any moving device or vehicle.

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;
    b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
    c. Name and phone number of the person responsible for the on-scene operation of the UAS;
    d. Make, model, and serial or N−Number of UAS to be used;
    e. Name and certificate number of UAS PICs involved in the aerial filming;
    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
    g. Signature of exemption holder or representative; and
    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on September 30, 2017, unless sooner superseded or rescinded.

Sincerely,
/s/
John S. Duncan
Director, Flight Standards Service

Enclosures

REMOTE INTELLIGENCE

May 20, 2015

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

Re: Exemption Request Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012, 49 U.S.C. § 44701(f), and Part 11 of the Federal Aviation Regulations

Dear Sir or Madam:

Remote Intelligence, LLC. ("RI"), pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") ("Section 333"), Subsection (f) of 49 U.S.C. § 44701, and 14 C.F.R. Part 11, is requesting an exemption from the Federal Aviation Regulations ("FARs") listed below and discussed in Appendix A to allow RI to conduct commercial operations with Prioria's Maveric small Unmanned Aircraft System ("sUAS") (the "Maveric") and Prioria's Hexacopter small Unmanned Aircraft System (the "Hex") to provide surveying and energy development services, which are primarily located in remote unpopulated areas with minimal air traffic. These services include obtaining still photographs, real-time video, and other data taken by onboard sensors to monitor operations, environmental conditions, and forestland security. Performing these services with a sUAS is in the public interest for several reasons, which are detailed further herein and include: (1) minimizing safety risks inherent in manned operations, both in the air and on the ground; (2) inspecting locations where humans are not able to go; (3) enhancing capabilities to utilize the sUAS to assist first responders on safety or environmental incidents; (4) improving access control/security to sites; and (5) monitoring environmental conditions.

The battery-powered Maveric weighs 2.6 pounds and has a flight time of 40-75 minutes depending on operating conditions. It employs a self-stabilizing aircraft configuration with stability augmentation avionics that provides ease-of-control and steady video imagery. Its high-performance design leverages advanced composite materials, innovative electronics, and cutting-edge sensor technology to increase mission capabilities and make Maveric a reliable and accurate solution to meet a variety of industry needs. The Maveric has operated in the United States under two Certificate of Waiver or Authorizations ("COAs").[1] Additionally, the Maveric has received operating approvals in Canada and Australia, and has been operated by the U.S. Army.

[1] Certificate of Waiver or Authorization 2011-ESA-26, issued to the Department of Energy Oak Ridge National Laboratory, and Certificate of Waiver or Authorization 2012-WSA-53, issued to Oregon State University.

The battery-powered Hex weighs 15.4 pounds with a flight time of 20-25 minutes, depending on operating conditions. It also employs stability augmentation avionics to provide ease-of-control and steady imagery. It is able to carry a larger payload, up to 5 pounds, giving it a wider range of useful sensor options for mapping and monitoring.

Operations under the exemption will be conducted under the limitations and conditions set forth in Appendix B and as may be modified by the FAA as required by Section 333.2 Use of the Maveric and Hex in RI's operations as proposed herein would provide significant public safety benefits over existing inspection and survey operations, while operating safely within the National Airspace System ("NAS").

Use of sUAS offer numerous safety benefits for operations on the ground. First, the use of sUAS would alleviate the need for personnel to perform difficult and dangerous manual inspections of remote, hazardous, or inaccessible locations along pipelines or facilities. Second, sUAS will be able to more quickly and thoroughly assess safety conditions of roads used by vehicles following storm events. Third, use of sUAS would increase situational awareness of the surroundings and help prevent conflicts if wildlife or unauthorized personnel gain access to the property, or if a wildfire or other event threatened the facilities. Finally, the use of sUAS would improve visual access to areas that are off limits to foot traffic and machinery due to risk of unstable, shifting earth or moving water.

The use of sUAS would provide RI's clients with additional data it can use to conduct safer and more efficient operations. For inspections now conducted by manned aircraft, use of the sUAS for these services will reduce the need to operate manned aircraft in a difficult environment and reduce the environmental impact of conventional aircraft operations. In addition, the small, lightweight, and easily controllable operating characteristics of the Maveric and Hex provide for safe operations over the remote or uninhabited locations of gas development and timberland. This feature would also be beneficial in surveying from above in detail features of facilities that it would be too dangerous to fly manned aircraft close to. Our clients also maintain strict control over access to their facilities, require all personnel to wear personal protective gear, including hard hats and safety glasses, and attend site-specific safety hazard briefings to be onsite, so these proposed operations would not endanger workers onsite.

Although the Maveric and Hex can be operated by one person, RI flight operations will always involve at least two people as required by the FAA: a vehicle operator ("VO") and a mission operator ("MO"). The VO is responsible for flying the sUAS, monitoring its status and flight dynamics, while keeping the flight within the manufacturer's specified operational limits to ensure safe operation of the vehicle. MOs will be responsible for monitoring the airspace for other aircraft and hazards and advising the VO before and during flight of all such observed risks. In addition to completing either RI training taught by a Prioria-accredited trainer or Prioria sUAS operator training, the VO will hold at least a private, sport, or recreational pilot certificate and third-class medical certificate or a state-issued motor vehicle Driver's license.

While RI has modeled its request off of Part 333 Exemption grants as of the date of its application, RI requests that the FAA treat RI's application as requesting the most lenient relief granted to similar applicants at the time of adjudication. Additionally, should the FAA modify any of its sUAS operating conditions through exemptions or otherwise after adjudicating RI's application, RI requests blanket approval to operate its sUAS in accordance with the more lenient operating conditions. RI reserves the right to supplement or amend its application.

Applicant Information:

The name of the applicant is: Remote Intelligence, LLC.
The primary contact for this application is:
Rob Schwarz
953 Lake Road
Wellsboro, PA 16901
Phone: (570) 244-7960
Email: rob@remote-intelligence.com

Exemptions Requested:

Remote Intelligence requests exemptions from the following regulations: 14 C.F.R. Part 21; 14 C.F.R. 61.113(a) and (b); 14 C.F.R. 91.7(a); 14 C.F.R. 91.119(c); 14 C.F.R. 91.121; 14 C.F.R. 91.151(a); 14 C.F.R. 91.405(a); 14 C.F.R. 91.407(a)(1); 14 C.F.R. 91.409(a)(1) and (2); 14 C.F.R. 91.417(a) and (b).

Airworthiness of the sUAS:

The Maveric has been shown to be airworthy and compliant through a history of granted flight operations in the United States, Canada, and Australia and successful flights in all three countries. The U.S. Military has accepted the Maveric for use as well and has flown it since 2011 in places like Afghanistan. Globally, the Maveric has amassed over 4,000 flight hours. For additional safety, the Maveric is equipped with automated features that ensure safe takeoff, flight, and landing in many conditions, further details of which are provided in Appendix C. In support of this application, the Maveric Operator's Manual ("Operator's Manual") will be provided. All flights will include an extensive pre- and post-flight inspection and systems check, following a prescribed protocol.

The Hex is a more recently developed system, which does not have the extensive history or proprietary (Prioria-developed) features of the Maveric. It does, however, utilize industry-standard sensors and controls, which provide numerous failsafes, and have amassed thousands of flight hours with modifications in response to observed problems. The Hex is equipped with automated features for safe takeoff, flight, and landings in varying conditions. The shorter flight times and very high maneuverability will dictate that this system will be used in close proximity to the operator and at lower altitudes, which will increase the safety of the system. As with the Maveric, a Hex Operator's Manual will be provided. Pre- and post-flight

inspections and systems checks will precede and follow each flight following a prescribed protocol. Test flights are conducted following any upgrades to system software, firmware, or hardware to ensure safety of operations.

Operating Conditions:

RI requests an exemption subject to the conditions listed in Appendix B, which are substantially similar to the operating conditions required for the FAA's previous grants of exemptions under Section 333. In accordance with the conditions approved in previous exemption grants, RI is requesting authority to operate the Maveric and Hex within visual line of sight and below 400 feet AGL except as provided by FAA Air Traffic Control via COA. The area of operations would include those lands owned or leased by RI's clients in the natural gas, wildlife, or timberland management industries across the United States. Given that the operating sites are often not flat, RI will use the elevation of the highest predominant terrain within 1 mile of the launch point and within the visual line of sight as a ground reference point to establish the 400 feet ceiling. 3 In other words, RI will not operate the Maveric or Hex any higher than 400 feet above the highest point within 1 mile from the launch point, and will only do so provided the UAS is within the line of sight. These operating conditions, along with those listed in Appendix B, would provide an equivalent level of safety for the reasons described below.

First, RI's clients are generally located in remote areas that rarely see air traffic that they are not aware of in advance.

Second, flight operations in many of our client locations are limited due to the terrain. In addition to the requirement that pilots must fly at least 500 feet AGL, the FAA recommends that pilots operating under Visual Flight Rules ("VFR") fly over ridges with at least 1,000 feet clearance. Pilots flying under instrument flight rules ("IFR") over mountainous areas must fly at "an altitude of 2,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown."[2] Given the locations of our projects and FAA minimum flight altitudes, the Maveric and Hex will be able to operate below altitudes in use by manned aircraft.

Third, the VO will operate the Maveric and Hex from higher elevations in regard to project area when possible, allowing the MO to maintain full visibility of the airspace over the project to avoid conflict with any manned aircraft. RI will use a MO who will stay in radio contact with the VO if the terrain warrants it. Additionally, Maveric's nose camera and Hex's forward-facing camera will provide real-time video of the sUAS's environment that the VO can use to avoid any airborne aircraft and other obstacles.

Fourth, RI's operational procedures will require VOs to deconflict by suspending all sUAS operations when a manned aircraft operates within airspace infringement boundaries,

[2] FAA Aviation Safety Program, Tips on Mountain Flying, available at https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/tips_on_mountain_flying.pdf. Pilots operating under VFR also must operate at an altitude that would allow them to make an "emergency landing without undue hazard to persons or property on the surface." 14 C.F.R. § 91.119(a). 6 FAR 91.177(a)(2)(i).

greatly reducing the risk to any manned aircraft. The VO will be able to immediately land the sUAS when the VO or MO spot another manned aircraft within the planned area of operations or safety personnel direct cessation of sUAS operations.

Fifth, RI maintains contact with any personnel onsite, requiring all personnel to wear personal protective gear, including hard hats and safety glasses, and mandates site specific safety training as required by clients. Non-participant RI employees will carry radios and be alerted before sUAS operations begin. These safeguards, along with the sUAS's light weight, provide an equivalent level of safety for non-participants to be closer than 500 feet.

Sixth, the Maveric and Hex is equipped with visible strobe lights that will alert any manned aircraft in the area to its position.

Seventh, the Maveric's and Hex's flight software provides many built-in functional and safety features to assist the VO in safe and reliable operation. Both systems can operate autonomously in "Navigation" mode. In Navigation mode, the VO selects waypoints, rally points, and a landing area before launching. The sUAS then uses GPS navigation to follow the pre-selected flight path. The sUAS also can be flown in a semi-autonomous mode in which the sUAS flight software maintains a preset altitude and airspeed and the VO controls heading. Additionally, the flight software allows the VO to set certain failsafes, i.e. actions the sUAS will take in response to loss of link, loss of GPS, and low battery regardless of the flight mode in which the sUAS is currently operating. For example, the VO can configure the failsafe so that, in a loss of link situation, the sUAS flies to a pre-set waypoint and loiters for a short time to give the sUAS time to reconnect with the ground control station and lands at a pre-set landing spot if loss of link persists beyond a pre-determined length of time. The VO can do the same for both loss of GPS and low battery situations. Finally, any risk presented by possible helicopter medical evacuation flights would be mitigated by requiring the VO to terminate sUAS operations at the command of safety personnel or the MO. The VO will maintain constant radio contact with safety personnel. RI requests authorization to operate the Maveric and Hex less than 500 feet from nonparticipating employees without barriers or structures to protect them, provided they wear customary safety gear (e.g. hard hats). An equivalent level of safety is provided because the sUAS's weight, materials, and reliability, along with the required operator training and operating environment, prevent these systems from posing a serious risk to clients/employees wearing personal protective gear.[3] The safety assessment includes consideration of the Maveric's mean time between failures ("MTBF")[4] —calculated with a large degree of confidence from the operation of the Maveric for over 4,000 hours—and its low kinetic energy.

Operator Requirements:

[3] Based on guidance issued in Exemption No. 11109, RI and Prioria will submit a safety assessment, under separate cover and with a request for confidentiality, to support their request for additional relief regarding the proximity of non-participants.

[4] Prioria's MTBF analysis will be submitted under separate cover with a request for confidentiality.

As a condition to the grant of the exemptions, RI will require that the VO hold a private, sport, or recreational pilot certificate and a valid third-class medical certificate or state-issued motor vehicle driver's license. The VO will have accumulated and logged a minimum number of flight cycles and hours for daytime operations, as required by the FAA. The VO will also be subject to the FAA flight review requirements. The VO and all observers will be required to have completed a RI training course taught by a Prioria-accredited trainer, or Prioria's training program. RI respectfully submits that the operator qualifications take into account the operating conditions and characteristics of the particular sUAS.

Public Interest:

RI respectfully submits that its use of the sUAS in lieu of manned operations, which are currently conducted with conventional fixed wing and rotary aircraft, offers a net safety benefit and will achieve an enhanced level of safety, as mandated under Section 333(c) of the Reform Act. Approval of this application also will benefit the public interest by allowing better, safer, and more cost efficient information gathering for the ecosystem services and energy development industries. Conventional aerial survey and inspection operations using manned aircraft involve very heavy aerial vehicles that must transit to the operational location and carry significant quantities of combustible fuels and a multi-person crew in piloting and observation roles. These operations become even more difficult in the energy and forestry industries due to the terrain. By contrast, the Maveric weighs 2.6 lbs. and Hex weighs 15.4 lbs., including its payload, uses a battery for power, is carried to and from the area of activity, removes the need for airborne pilots and observers, and poses less risk to people and infrastructure on the ground, as well as other aircraft. Additionally, no national security issue is raised by the grant of the requested exemptions due to the sUAS's small size and load-carrying capacity, as well as its operational limitations and absence of flammable fuel. All VOs will have been screened by the Department of Homeland Security. On the other hand, the use of these systems is likely to enhance national security through better and more accurate monitoring of critical national infrastructure. The grant of the requested exemption is in the public interest based on the clear direction in Section 333 and 49 U.S.C. § 44701(f),[5] the equivalent and enhanced level of safety of the proposed operations, the significant public benefit, and cost savings to be realized as a result of the use of sUAS for aerial inspection and survey services. Moreover, the FAA has granted similar exemptions for sUAS used to conduct high resolution aerial imaging and surveying operations.[6] Accordingly, the applicant respectfully requests that the FAA grant the requested exemption without delay.

[5] Under 49 U.S.C. § 44701(f), the "Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any of sections 44702-44716 of [Title 49] if the Administrator finds the exemption is in the public interest."

[6] See Exemption Nos. 11109, 11110, 11136, 11166, 11167, 11170, 11172.

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Privacy Concerns:

The proposed operations will take place only in largely unpopulated, remote areas that are owned or leased, and access controlled by RI's clients. Access to these areas is generally restricted to employees and authorized personnel only. No privacy issues are raised by this application.

Federal Register Summary:

Pursuant to 14 C.F.R. § 11.81(f), the following summary is provided for publication in the Federal Register, should the FAA determine that publication is needed:

Docket No.: No. FAA-2015-____
Petitioner: Remote Intelligence, LLC
Section of 14 CFR: Part 21, § 61.113(a) and (b), § 91.7(a), § 91.119(c), § 91.121, § 91.151(a), § 91.405(a), § 91.407(a)(1), § 91.409(a)(2), § 91.417(a) and (b).
Description of Relief Sought: Remote Intelligence is seeking an exemption to conduct commercial operations using a small unmanned aircraft (55 pounds or less) in remote areas of the United States.

RI requests that the FAA not request public comment on its application because it would not set a precedent and because the relief requested is identical to exemptions granted previously. 14 C.F.R. § 11.87.

Sincerely,

Robert Schwarz

APPENDIX A

EXEMPTION REQUEST AND EQUIVALENT LEVEL OF SAFETY SHOWINGS UNDER APPLICABLE RULES SUBJECT TO EXEMPTION

Remote Intelligence requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the Maveric sUAS:

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates

Part 21, Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by § 91.203(a)(1). Given the size and weight of the aircraft, the operating conditions, design safety features, and the proposed conditions and limitations, it is unnecessary to go through the certificate of airworthiness process under Part 21 Subpart H to achieve or exceed current safety levels. Such an exemption meets the requirements of an equivalent level of safety under Part 11 and Section 333. Section 333 and 49 U.S.C. § 44701(f) 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 of the sUAS involved.

In this case, an analysis of these criteria demonstrates that the sUAS operated without an airworthiness certificate, under the conditions proposed herein, will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) with an airworthiness certificate. The Maveric weighs 2.6 pounds and Hex weighs 15.4 pounds fully loaded. It will not carry a pilot, passenger or flammable fuel. These sUASs operate exclusively within a controlled area pre-disclosed and in compliance with conditions set forth herein. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by the VO and observer(s), pursuant to the conditions set forth in Appendix B, the Operator's Manual, and local public safety requirements. The lack of flammable fuel and the fact that the aircraft is carried to the location and not flown there all establish the equivalent level of safety. The sUAS provides at least an equivalent level of safety to that of such operations being conducted with conventional aircraft that would be orders-of-magnitude larger and would be carrying passengers, cargo, and flammable fuel.

14 C.F.R. §§ 61.113(a) & (b): Commercial Pilot Privileges

Sections 61.113(a) & (b) limit private pilots to non-commercial operations. Unlike a conventional aircraft that carries a pilot, passengers, and cargo, the Maveric is remotely controlled with no passengers or property of others on board. The area of operation is controlled and restricted, and all flights are planned and coordinated in advance as set forth in the Operator's Manual. In conjunction with the required training of the VO and observers, the level of safety provided by the requirements included in the Operator's Manual exceeds that provided by a single individual

holding a commercial pilot certificate operating a conventional aircraft. The proposed operations will achieve at least an equivalent level of safety.

14 C.F.R. § 91.7(a): Minimum Safe Altitudes

Section 91.7(a) prohibits an individual from operating a civil aircraft unless it is in an airworthy condition. No FAA standard exists for determining an aircraft's airworthiness when an airworthiness certificate is not issued. As the FAA has done with previous exemption grants,[7] airworthiness will be ensured and an equivalent level of safety will be achieved by compliance with the operating documents prior to every flight.

14 C.F.R. § 91.119(c): Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Specifically, Section 91.119(c) limits aircraft flying over areas other than congested areas to an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. Because some of the aerial inspection and survey work must be accomplished at altitudes less than 500 feet AGL and nonparticipating employees will be working within 500 feet of the sUAS, an exemption from Section 91.119(c) is needed.

The equivalent level of safety will be achieved because RI's employees and the client's onsite employees are required to wear personal protective gear and because the sUAS, given its size, weight, speed, and materials, does not pose a serious risk. Also, every flight will be conducted over land owned or controlled by RI's clients. Compared to aerial inspection operations conducted with aircraft or rotorcraft weighing far more than 2.6 pounds (for the Maveric or 15.4 pounds for the Hex) and carrying flammable fuel, any risk associated with these operations will be far less than those currently allowed with conventional aircraft operating at or below 500 feet AGL.

14 C.F.R. § 121: Altimeter Setting

Section 121 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 sUAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption is required. An equivalent level of safety will be achieved by the operator, pursuant to the Operator's Manual, confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

[7] Exemption Nos. 11156, 11158, 11159.

14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

This regulation prohibits an individual from beginning "a flight in an airplane 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 – (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes."

The Maveric batteries provide approximately 40-75 minutes of powered flight. Without an exemption from 14 C.F.R. § 91.151, the Maveric's flights would be limited to approximately 10 minutes in length because the VO would require the last 30 minutes to satisfy section 91.151(a). The Hex batteries provide approximately 20-25 minutes of flight. Without and exemption from 14 C.F.R. § 91.151, the Hex's flights would not be allowed to takeoff because the VO would require the last 30 minutes to satisfy section 91.151(a). Given the limitations on its proposed operations, a longer time frame for flight in VFR conditions is reasonable.

RI believes that an exemption from 14 C.F.R. § 91.151(a) provides an equivalent level of safety and is consistent with prior exemptions.[8] Operating the sUAS, without 30 minutes of reserve fuel does not engender the type of risks that Section 91.151(a) was meant to prevent given the size and speed at which the sUAS operates. In the unlikely event that the sUAS' battery runs low, it would simply follow the pre-programmed command to land at a designated location. Given its weight and construction material, the risks are less than contemplated by the current regulation.

RI believes that an equivalent or enhanced level of safety can be achieved by maintaining 10 minutes of reserve power for the Maveric which, allowing at least 30 minutes of flight time, if not more, would be more than adequate to return the sUAS to its planned landing zone from anywhere in its limited operating area. For the Hex, because of its shorter flight times and closer proximity of flights, RI believes that 5 minutes of reserve power should be retained, allowing for at least 15 minutes of flight time.

14 C.F.R. §§ 91.405(a), 91.407(a)(1), 91.409(a)(2), and 91.417(a): Maintenance Inspections

Section 91.405(a) requires 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." Section 91.407 similarly makes reference to requirements in Part 43. Section 91.409(a)(2) requires an annual inspection for the issuance of an airworthiness certificate. Section 91.417(a) requires the owner or operator to keep records showing certain maintenance work that has been accomplished by certificated mechanics, under Part 43, or licensed pilots and records of approval of the aircraft for return to service.

Pre-flight checks will be performed by a qualified person prior to each flight and at predefined intervals as part of the maintenance schedule.

[8] Exemption 10673 (allowing Lockheed Martin Corporation to operate without compliance with 91.151(a)); see also Exemptions 2689F, 5745, 10673 and 10808

The pre-flight checklist includes:

1. Visual inspection of the airframe;
2. Visual inspections of propeller(s);
3. Verify GPS acquisition;
4. Plan and upload mission;
5. Video and payload check;
6. Controls check;
7. Gyro/control surfaces check (Maveric only);
8. Throttle check;
9. Check pitot tube readings (Maveric only);
10. Check sensors; and
11. Verify failsafes are set correctly.

An equivalent level of safety will be achieved because the sUAS will operate only in restricted predetermined areas, and at low altitudes. In addition, the operator will ensure that the sUAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance that is performed. Test flights will be conducted prior to operations following adjustments to sUAS hardware, software, or firmware. Moreover, the operator is the person most familiar with the aircraft and is best suited to maintain the aircraft in an airworthy condition and to ensure an equivalent level of safety. Last, the Operator's Manual will have instructions to develop and document maintenance, overhaul, replacement, and inspection requirements in the absence of Prioria requirements, and procedures to document and maintain maintenance records for the sUAS. The sUAS maintenance guidelines provide an equivalent level of safety to the maintenance requirements in Part 91.

APPENDIX B

RI OPERATING LIMITATIONS

1) Operations authorized by the grant of exemption are limited to the following aircraft: Prioria's Maveric and Hex, which each weighing less than 7 kg.

2) The sUAS shall not be flown at a ground speed exceeding 60 kts.

3) The sUAS will not be operated at an altitude more than 400 feet above the highest predominant terrain except as may be provided by FAA Air Traffic Control ("ATC") via COA. The highest predominant terrain is defined as terrain within 1 mile of the launch point and within the visual line of sight of the VO. All altitudes reported to ATC shall be in feet AGL.

4) All operations must use a MO. The MO and VO must be able to communicate verbally at all times. The VO must be designated before the flight. The VO must ensure that the MO can perform the functions prescribed in the operating documents.

5) The operating documents and this grant of exemption must be accessible during UAS operations and made available to the Administrator upon request. If a conflict exists between the conditions and limitations in the exemption and the procedures outlined in the operating documents, the conditions and limitations in the exemption take precedence and must be followed. Otherwise, RI must follow the procedures as outlined in its operating documents. RI may update or revise its operating documents. It is RI's responsibility to track such revisions and present updated and revised documents to the Administrator upon request. RI must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption.

6) Prior to each flight the VO must inspect the sUAS to ensure that it is in a condition for safe flight. The VO shall not operate the aircraft if the inspection reveals a condition that affects the safe operation of the sUAS until the necessary maintenance has been performed and the sUAS is found to be in a condition for safe flight. The Ground Control Station, if utilized, must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records.

7) Any sUAS that has undergone maintenance or alterations that affect the sUAS operation or flight characteristics (e.g., replacement of a flight critical component) must undergo a functional test flight in accordance with the Operator's Manual. The VO who conducts the functional test flight must make an entry in the aircraft records of the flight. The requirements and procedures for a functional test flight and aircraft record entry shall be included in the Operator's Manual.

8) The pre-flight inspection must account for all discrepancies, e.g. inoperable components, items, or equipment, not already covered in the relevant sections of the operating documents.

9) RI must follow Prioria's aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.

10) RI must carry out its maintenance, inspections, and record keeping requirements, in accordance with the operating documents. Maintenance, inspection, alterations, and status of replacement/overhaul component parts must be noted in the aircraft records, including total time in service, description of work accomplished, and the signature of the person authorized to return the sUAS to service.

11) Each sUAS operated under this exemption must comply with all manufacturer Safety Bulletins.

12) The VO must possess at least a private, sport, or recreational pilot certificate and at least a current third class medical certificate or a valid state-issued motor vehicle driver's license. The VO must also meet the flight review requirements specified in 14 C.F.R. § 61.56 in an aircraft in which the VO is rated on his or her pilot certificate.

13) RI may not permit any VO to operate unless the VO meets the operator's qualification criteria and demonstrates the ability to safely operate the sUAS in a manner consistent with how the sUAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures.[9] VO qualification flight hours and currency must be logged in a manner consistent with 14 C.F.R. § 61.51(b). The VO must ensure that the MO is trained appropriately in order to fulfill his or her duties. A record of training and qualification must be documented and made available upon request by the Administrator. Flights for the purposes of training the operator's VOs and MOs (training, proficiency, and experience-building), are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the VO must operate the UAS with appropriate distance from nonparticipants in accordance with these operating conditions.

14) Operations may not be conducted during night, as defined in 14 C.F.R. § 1.1. All operations must be conducted under visual meteorological conditions ("VMC"). Flights under special visual flight rules ("SVFR") are not authorized.

15) The sUAS may not operate within 5 nautical miles of an airport reference point as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by RI's COA. The letter of agreement with the airport management must be made available to the Administrator upon request.

[9] Prior documented flight experience that was obtained in compliance with applicable regulations may satisfy this requirement.

16) The sUAS may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the VO.

17) If the sUAS loses communications or loses its GPS signal, the sUAS must return to a pre-determined location within the security perimeter and land or be recovered in accordance with the Operator's Manual.

18) The VO must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the Operator's Manual.

19) sUAS operations must be completed within 30 minutes flight time.

20) RI must obtain an ATC-issued COA prior to conducting any operations under this exemption (unless operations are conducted within the limits of a blanket COA).

21) All aircraft operated in accordance with the requested exemption must be identified by serial number, registered in accordance with 14 C.F.R. Part 47, and have identification (N-Number) markings in accordance with 14 C.F.R. Part 45, Subpart C. Markings shall be as large as practicable.

22) The radio frequency spectrum used for operation and control of the sUAS must comply with Federal Communication (FCC) or other appropriate government oversight agency requirements.

23) The documents required under 14 C.F.R. §§ 91.9 and 91.203 must be available to the VO at the Ground Control Station of the sUAS any time the aircraft is operating. These documents shall be made available to the Administrator or any law enforcement official upon request.

24) The sUAS must remain clear and yield the right of way to all other manned operations and activities at all times.

25) The sUAS may not be operated from any moving device or vehicle.

26) The sUAS may not be operated over congested or densely populated areas.

27) Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, structures, and public access roads unless:

a. The nonparticipating persons are authorized to access the client's site and are wearing personal protective gear;

b. For non-participants who do not qualify as client employees, barriers or structures are present that sufficiently protect them from the sUAS and/or debris in the event of an accident. The operator must ensure that nonparticipating persons who are not client employees remain under such protection. If a situation arises where nonparticipating persons who are not client employees leave such protection and are within 500 feet of the sUAS, flight operations must cease immediately; or

c. The aircraft is operated near vessels, vehicles or structures where the owner/controller of such vessels, vehicles or structures has granted permission and the VO has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

28) Operations nearer than 500 feet to the VO, MO, operator trainees or essential persons as defined in the operating documents are permitted if those operations do not present an undue hazard to those persons per § 91.119(a) as determined by the VO.

29) All operations must be conducted over remote, private, or controlled-access property.

30) Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA shall be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

APPENDIX C

SMALL UNMANNED AERIAL SYSTEM DESCRIPTION

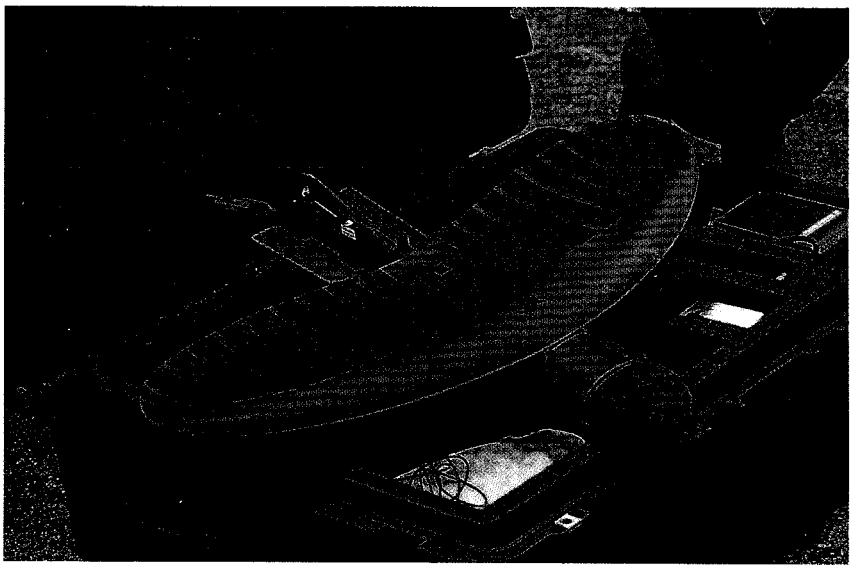
Remote Intelligence Corporate Overview:

Remote Intelligence is a Pennsylvania corporation with its headquarters in Wellsboro, Pennsylvania. RI is a premier U.S.-based natural resource and ecosystem service company with industry-leading experience, significant oil and gas collaborations, and a growing emphasis on educational partnerships.

Maveric sUAS SYSTEM DESCRIPTION

sUAS Operating Overview - Maveric:

The Maveric is a fixed-wing aircraft constructed of a rugged carbon fiber composite with bendable wings that requires no assembly. It has fully autonomous operation for takeoff, navigation, and landing.



Parameter	Characteristic
Wingspan	29.5 in
Length	26.5 in
Weight, with EO side-look payload	2.6 lbs
Wireless Range	5 – 15 km LOS
Cruise Speed (Best Endurance)	26 kts (30 mph)
Dash Speed	55 kts (63 mph)
Stall Speed	18 kts (21 mph)
Max wind	20 kts sustained, 30 kts gusting

Precipitation	Light rain (0.1 inches per hour)
Flight Duration	45 – 70 minutes
Turn Rate	360 degrees in 12 seconds
Climb Rate	500 ft/min @ 2,000 AMSL
Launch	Hand launch, tube launch optional
Landing	Deep-stall, skid, net optional
Flight Control	Autonomous or manual
Exterior Lighting	Visible and IR Strobe Lights
Command and Control Frequency	350 MHz, 900 MHz
Video Bands	1.7 GHz, 2.4 GHz

The sUAS can be operated in fully autonomous flight modes. Creating pre-planned flight paths to fly in autonomous mode is as simple as clicking on the map to create a pre-planned flight path. Pre-mission waypoints, landing zone points, and flight area dimensions can all be entered during preflight, ensuring the sUAS operates only within specified parameters.

The Maveric includes many advanced safety features that makes it the safest choice for areas like pipeline construction. Built-in intelligent fault handling allows the sUAS to detect a system fault while in the air, and to automatically respond with a set command (one such option being to fly back to a preselected rally point and land). Faults that can be detected include: loss of communication, loss of GPS, and low battery levels. In addition, the operator can create no fly zones, and the system will visually and audibly warn the operator if the planned flight path would enter the no fly zone.

Operator's Manual – The Maveric Operator's Manual will be provided under separate cover with a request for confidential treatment.

Power – The Maveric and its ground control station are both powered by a Lithium polymer rechargeable battery pack. A new battery has a fully charged voltage of approximately 12.4V. A "full-pack" has a capacity of 4 Amp-hours. An additional "half-pack" can be installed for extended operation. A new "half-pack" has a fully charged voltage of 12.4V and a capacity of 2 Amp-hours. The Maveric's battery charge is displayed in real-time on the ground control terminal, ensuring maximum flight duration and safety.

Takeoff and Landing style/type – The Maveric is hand launched and can be tube launched with additional equipment. The Maveric lands by returning to a pre-determined rally point and beginning a spiral descent. Once it reaches a preselected altitude, it heads toward the landing waypoint, descending until it lands and skids to a stop.

Navigation System – Specific maps can be downloaded to the display screen (such as air sectional and geographic maps) which are overlaid with GPS positional data. Waypoints can be created before and during flight operation creating specific locations and sequences for the aircraft.

Defined "Keep Out" Areas – The navigation software allows for preplanning Keep Out Areas that allow the operator to designate airspace he or she does not want the Maveric to enter. If defined flight paths pass through an area designated as keep-out, the individual waypoints and waypoint connection segments turn red as a warning. Additionally, if a mission is uploaded and intersects with a keep out area, a warning is presented to the user. Also, if an aircraft in flight is navigated into a designated keep out area, an audible warning is sounded.

Maintenance – The Maveric sUAS needs very little maintenance, and operators may perform most required maintenance in the field with the field repair kit.

Command and Control Systems - The sUAS Ground Control Station (GCS) allows the operator simultaneous control over aircraft and payloads. The display screen provides all essential flight data to the operator. Telemetry data is transmitted to the command station at least once per second.
Displayed on GCS:

- Current position
- Registered home position
- Any autopilot flight plans
- Registered emergency landing zone
- Aircraft attitude
- Altitude
- Airspeed
- Groundspeed
- Compass reading/heading
- Estimated wind heading
- Communication strength
- Range from home
- Bearing from home
- Duration of current mission
- Rate of climb
- Mode of the aircraft
- Battery level

Emergency Procedures and System Failures
Loss of Link – The sUAS does not need constant signal from the GCS to continue flying. Communications outages are detected by the system and are reported to the VO. During the communication outage, the sUAS continues on its pre-determined flight path until a failsafe is triggered. Once a failsafe is triggered, the sUAS will perform in accordance with the failsafe conditions uploaded before launch. This is accomplished without input from the operator.

Security
The system and communication links may be encrypted.

HEX sUAS SYSTEM DESCRIPTION

sUAS Operating Overview: Prioria's Hex Flyer is a multi-rotor, vertical take-off and landing platform. It simplifies users' installation and enables quick disassembling. Frame arm integrates with ESC and motor. With DJI WKM autopilot system, it can achieve hovering, cruising and other flight elements. Hex Flyer can be applied for aerial photography and other aero-modeling activities.

The basic airframe T810 is manufactured by Tarot-RC, leading manufacturer of consumer and commercial grade unmanned aerial systems. The T810 airframe is used extensively in TV and film industry as an aerial video/photo platform. Prioria performs all assembly and payload integration.

Parameter	Characteristic
Wingspan (rotor tip to rotor tip)	37 in
Height	12.6 in
Weight, with standard payload	15.4 lb
Wireless Range	<5 km LOS
Rate of Climb	6 m/s max
Rate of Descent	3 m/s typical
Cruise Speed	10 m/s
Approach Speeds	N/A
Operating Altitude Range	175 m (limited by SW)
Max wind	15 kts sustained, 20 kts gusting
Precipitation	None

Flight Duration	15-25 Minutes
Turn Rate	360 degrees in 12 seconds
Climb Rate	500 ft/min @ 2,000 MSL
Launch	Vertical takeoff
Landing	Vertical landing
Flight Control	Autonomous or manual
Exterior Lighting	Yes
Command and Control Frequency	900Mhz / 2.4 Ghz
Video Bands	1.2 or 5.8 Ghz

Operational Characteristics	
Characteristic	Yes/No
Lights Out Operation	No
VFR Operations	Yes
IFR Operations	No
Day Operations	Yes
Night Operations	No

Avionics Equipment	
Equipment	**Yes/No**
GPS	Yes
Moving Map Indicator	Yes
Tracking Capability	No
TCA/MCAS Collision Avoidance	No
ELT (Falcon Tracker)	Yes
Transponder	No

The sUAS can be operated in fully autonomous flight modes. Creating pre-planned flight paths to fly in autonomous mode is as simple as clicking on the map to create a pre-planned flight path. Pre-mission waypoints, landing zone points, and flight area dimensions can all be entered during preflight, ensuring the sUAS operates only within specified parameters.

Built-in intelligent fault handling allows the sUAS to detect a system fault while in the air, and to automatically respond with a set command (one such option being to fly back to a pre-selected rally point and land). Faults that can be detected include: loss of communication, loss of GPS, and low battery levels.

Operating Manual –

Power – The Hex and its ground control station are both powered by a Lithium polymer rechargeable battery pack. A new battery has a fully charged voltage of approximately 25.1V. The Hex's battery charge is displayed in real-time on the ground control station, ensuring maximum flight duration and safety.

Launch and Recovery Procedures
The Hex Flyer utilizes vertical takeoff and landing, commanded either via Radio Control Transmitter or Automatic operation via Data Link and Ground Station Software.
In RC mode, Pilot uses GPS, Attitude, or Manual modes via RC hand controller to maneuver aircraft for takeoff or landing.
To utilize automatic operation, Pilot sets GPS flight mode in RC Controller, then uploads flight plan to aircraft via Datalink. Once upload is complete, pressing "GO" button in GS activates auto takeoff and flight to first waypoint in flight plan. For landing, pilot sets Go Home mode in GS. Once Aircraft is situated over Home waypoint in stable hover, Pilot sets "Autoland" mode. Aircraft then executes slow descent automatic landing.

Takeoff and Landing style/type – The Hex uses a vertical takeoff and landing style, commanded either via Radio Control Transmitter or Automatic operation via Data Link and Ground Station Software. R/C: Pilot uses GPS, Attitude, or Manual modes via RC hand controller to maneuver aircraft for takeoff or landing.

Automatic: Pilot sets GPS flight mode in RC Controller, then uploads flight plan to aircraft via datalink. Once upload is complete, pressing "GO" button in GS activates auto takeoff and flight to first waypoint in flight plan. For landing, pilot sets Go Home mode in GS. Once Aircraft is situated over Home waypoint in stable hover, Pilot sets "Autoland" mode. Aircraft then executes slow descent automatic landing.

Navigation System –GCS uses Google Earth Plugin for live map imagery which can also be pre-cached for offline use in the field. Waypoints can be created before and during flight operation creating specific locations and sequences for the aircraft.

Maintenance – The Hex sUAS needs very little maintenance, and operators may perform most required maintenance in the field with the field repair kit

Command and Control Systems - The Main Controller (MC) is the brain of the system. It communicates with the IMU, GPS/Compass, ESCs, and RC transmitter to carry out autopilot functionality. The Main Controller has a USB interface for configuration and firmware updates via a PC. The Inertial Measurement Unit (IMU) consists of one 3-axis accelerometer, one 3-axis gyroscope and a barometer. It is used for sensing the attitude. The GPS/Compass module is for sensing the position and direction. The LED indicates different states of system. Specially designed for the Controller to convert the higher voltage of the power circuit to the lower voltage

required for the receiver etc. It contains two regulated power outputs for the entire Controller system and receiver separately, a battery voltage monitor, and CAN-Bus interfaces.

Ground Control Station

Ground Station enables 3-D Map Way Points Editing, Flight Path Planning, Real-time Flight State Feedback and Auto Takeoff and Landing. Working with the autopilot system, DJI Ground Station not only ensures stable performance and safety of the aircraft, easy operation for the pilot, but also allows the aircraft to fly along the flight path set before or modified during the flight mission in the Ground Station software autonomously.

Displayed on GCS:

- Current position
- Home position
- Flight plan
- Aircraft attitude
- Altitude
- Airspeed
- Groundspeed
- Compass reading/heading
- Communication strength
- Range from home
- Bearing from home
- Duration of current mission
- Rate of climb
- Mode of the aircraft
- Battery level

Emergency Procedures and System Failures

Loss of Link – The sUAS does not need constant signal from the GCS to continue flying. Communications outages are detected by the system and are reported to the PIC. During the communication outage, the sUAS continues on its pre-determined flight path until a failsafe is triggered. Once a failsafe is triggered, the sUAS will perform in accordance with the failsafe conditions uploaded before launch. This is accomplished without input from the operator.