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

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

August 19, 2015

Exemption No. 12506
Regulatory Docket No. FAA−2015−1725

Mr. Drew F. Van Duren
1365 Peacock Court
Templeton, CA 93465

Dear Mr. Van Duren:

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 8, 2015, you petitioned the Federal Aviation Administration (FAA) for an exemption. You requested to operate an unmanned aircraft system (UAS) to conduct aerial photography, videography, and remote sensing research and development.

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 is a DJI Phantom 2 Vision+.

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, Mr. Drew F. Van Buren 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.

**Conditions and Limitations**

In this grant of exemption, Mr. Drew F. Van Buren is hereafter referred to as the operator.

[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.

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 DJI Phantom 2 Vision+ 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 August 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

May 8, 2015

US. Department o f Transportation, Docket Operations

West Building Ground Floor, Room w12-140
1200 New Jersey Avenue, SE Washington, DC 20590

Subj: *Petition for Exemption to Operate the DJI Phantom 2 Vision Plus Quad-Copter Unmanned Aerial System for Commercial Aerial Sensing and Data Collection Purposes*

Dear Sir or Madam:

The purpose of this letter is to petition the Federal Aviation Administration for an exemption from certain Federal Aviation Regulations in order for the petitioner, Drew F. Van Duren, to operate an Unmanned Aerial System (UAS) within California central coast region (San Luis Obispo, Santa Barbara and Monterey Counties) of the National Airspace System, in furtherance of his activities as a building (real estate and engineering) photographer and aeronautical engineer. Mr. Van Duren is well acquainted with the risks that come with the privilege of operating an aircraft in the United States, but also with the opportunities available via new unmanned flight technology. He holds a Private Pilot Certificate and has logged 180 hours of flight time in single-engine, land- rated aircraft. He also has more than 50 hours of logged flight time of that particular unmanned aircraft that is the subject of this Petition. He also holds a degree in Aeronautical Engineering, has extensive knowledge of UAS operations and has directly supported the FAA UAS Integration Office in the development of robust communications security requirements for UAS operations in the National Airspace System. As an aerial sensing expert, photographer and engineer, the petitioner would like to combine the benefits of an unmanned aviation platform with his profession to further the opportunities for safe, cost-effective aerial imaging services for the public at large.

Accordingly, and pursuant to 14 CFR §§ 11.61-.103 and Section 333 of the FAA Modernization and Reform Act of2012, PL 112-95 (Feb. 14, 2012), the petitioner is submitting the following information with this request:

***Identity of Petitioner.***

Petitioner:

Drew Van Duren
1365 Peacock Court
Templeton, CA 93465

***Description of Operations.***

**A. The UAS that is the Subject of this Petition.**

Mr. Van Duren is the owner of a DJI Phantom 2 Vision Plus Aerial Kit unmanned aircraft with a serial number of PH645488153 and its associated portable ground station controller (together the "Subject UAS"). The Subject UAS is a quad-copter with a camera mounted beneath it, piloted via a portable ground station. It has an empty weight of approximately 1,000 grams, and a maximum weight of 1,300 grams, with the camera and 3-axis gimbal mounted as payload. The Phantom 2 is a widely known unmanned aircraft, and is the same type of aircraft that was recently the subject of the grant of an exemption by the FAA. See In re Douglas Trudeau, FAA Exemption No. 11138 (Jan. 5, 2015) and re Daniel Achatz, FAA Exemption No. 11434 (Apr. 27, 2015).

The portable ground station used by Mr. Van Duren to pilot the unmanned aircraft is a two-channel, wireless communication device using an FCC-compliant 5.8GHz frequency band for the video link, and a 2.4 GHz transmitted. The two frequency bands interoperate well for simultaneous vehicle command and control and payload operations. The Subject UAS is equipped with lost-link capability, which enables the Phantom 2 to enter a fail-safe Return-to-Home Mode in the event that the link fails to provide command authority.

The Subject UAS can operate for a total of approximately 20 minutes on one battery charge. It has a maximum range from the ground station of 2,300 feet. However, it also has programmable height and radius limits to establish an operations area. Without programming the Subject UAS, it has a default height limit of 393 feet AGL.

**B. The UAS Pilot in Command.**

Mr. Van Duren began flying as a student pilot at age 17 in 1990. He conducted his flight training at Hayward air terminal in the San Francisco bay area. He was issued his private pilot certificate in July of 1990. As of the date of this letter, he has 180 hours of accumulated flight time, has obtained basic instrument flight and aerobatics training.

Mr. Van Duren has never been subject to an FAA enforcement action. Nor has he ever been involved with an aircraft accident or incident.

With regard to the Subject UAS, Mr. Van Duren has made numerous flights as a hobbyist, and has accumulated more than 50 hours of flight time with the Subject UAS. He has thousands of hours of hobby-related flight time of fixed wing, rotor and multi-rotor Radio Control aircraft.

In addition, Mr. Van Duren is a graduate in aeronautical engineering from California Polytechnic State University, is an expert in aircraft guidance, navigation and control, and in his professional duties has performed extensive risk modeling and development of secure, cryptographic UAS

Command-and-Control communications requirements for the FAA UAS Integration Office and RTCA.

**C. UAS Operating Parameters and Intended Mission Profile.**

Mr. Van Duren is a engineering entrepreneur and additionally holds a California Real Estate license. He performs a variety of photographic work, video production and remote sensing research and development.

The majority of the petitioner's operations will be conducted in and around the central coast of California supporting the agricultural and real estate industries. He intends to use the Subject UAS to conduct aerial photography for real estate brokers and agricultural remote sensing for the central coast and central valley wine-growing region.

Most operations would be flown in the southern San Francisco (SSF) Sectional Chart and northern Los Angeles (SLA) Sectional chart. The operations may be conducted at various locations in the area during the period that the exemption would be in effect. Due to the wide geographic range of intended operations, there are not specific locations intended for operation.

Mr. Van Duren would adopt with the following UAS Operating Parameters:

| # | Topic | Parameter |
|---|---|---|
| 1 | Operating Ceiling and Range | All missions will be conducted below 400' AGL, and within a radius distance of 800' from the portable ground station. |
| 2 | Mission Definition | Each mission will consist of one flight |
| 3 | Point of Origin and Warnings | Mr. Van Duren will establish a fixed location (home point) where he will be positioned with the portable ground station, and where he will post a sign near the ground station stating, ***"Aerial Photography and Data Collection in Progress- Remain Back 150 feet."*** |
| 4 | Pilot-In-Command & Line of Sight Operations | Mr. Van Duren will act as the pilot in command and will have direct line of sight visual observation of the aircraft at all times, and operate only within visual line of sight. He will conduct all operations under his own personal and flight safety protocols, and post a sign near his control station. |
| 5 | Proximity to Structures | In terms of proximity to the residence or structure being photographed, Mr. Van Duren may operate in a close proximity to the structure, and in some cases as close as 25' away from the structure. When that happens, he will operate at less than two miles per hour and operate parallel flight to the structure walls, making the risk of collision almost negligible. |
| 6 | Lost Link Procedures | Prior to the start of a flight, Mr. Van Duren will activate and use the UAS's global positioning system flight safety procedure and lost-link function settings to ensure return of the aircraft in the event of a lost |

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|---|---|---|
| | | link or compromised or degraded communications between ground station and aircraft. |
| 7 | Reserve Flight Time | On each mission, the aircraft will return to the control pad with no less than five 5 minutes of battery power remaining. |
| 8 | Typical Flight Time | Each mission will last for no more than twenty minutes of flight time. |
| 9 | Controlled Airspace Operations and Permissions | In the event that any mission would ever occur within the airspace of a specific airport (e.g., if the operation will involve photographing a residence or performing agricultural scanning located in class D airspace) or controlled airspace, Mr. Van Duren shall obtain the permission of that control tower to operate in that airspace or from the appropriate control authority. |
| 10 | Controlled Airspace Operations and Permissions | In the event that any mission will occur within five miles of an airport, Mr. Van Duren shall ensure the airport is notified of the estimated flight time, flight duration, elevation of flight, and pertinent information. |
| 11 | Weather | Mr. Van Duren will conduct all flights in permissible weather, and during hours from BMNT to EENT. |
| 12 | Secure Communications | Mr. Van Duren will enable the VPN (Virtual Private Network) function to establish a full duplex, encrypted and data-origin authenticated between the subject UAS and ground station. This function is designed to mitigate the potential for malicious or accidental 3rd party commands to be sent to the subject UAS. |
| 13 | Visual Observer | Mr. Van Duren will utilize a Visual Observer (VO) to assist in all Visual Line of Sight (VLOS) operations. The VO will be co-located with Mr. Van Duren, the Pilot in Command. |
| 14 | Flight Operation Documents | Mr. Van Duren will maintain accessibility of all Operating documents during flight operations. |
| 15 | Maintenance and Alterations | Following maintenance or alterations on the subject UAS, Mr. Van Duren, as Pilot in Command, will perform a functional flight test of the vehicle. Flight tests will be performed with the VO and remain at least 500 ft. from other people. |
| 16 | Aircraft Identifier and Markings | Mr. Van Duren will operate the subject aircraft identified by its serial number markings (registered in accordance with 14 CFR part 47), and have identification (N−Number) markings in accordance with 14 CFR part 45, Subpart C. |

***Specific Sections of14 CFR From Which Petitioner Seeks an Exemption.***

Mr. Van Duren seeks an exemption from the following FARs:

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|---|---|
| 14 CFR Part 21, Subpart H | Certification procedures for products and parts, Airworthiness Certificates |
| 14 CFR Part 36 | Noise standards: Type and airworthiness |
| 14 CFR § 45.23 | Display of marks; general |

| | |
|---|---|
| 14 CFR Part 61 | Certification: Pilots, flight instructors, and ground instructors |
| 14 CFR § 91.7 | Civil aircraft airworthiness |
| 14 CFR § 91.9 | Civil aircraft flight manual, marking, and placard requirements |
| 14 CFR § 91.103 | Preflight action |
| 14 CFR § 91.105 | Flight crewmembers at stations |
| 14 CFR § 91.109 | Flight instruction |
| 14 CFR § 91.119 | Minimum safe altitudes |
| 14 CFR § 91.121 | Altimeter settings |
| 14 CFR § 91.151 | Fuel requirements for flights in VFR conditions |
| 14CFR§91.173 | ATC clearance and flight plan in IFR conditions |
| 14 CFR § 91.203 | Civil aircraft: Certifications required |
| 14 CFR § 91.207 | Emergency locator transmitters |
| 14 CFR Part 91, Subpart E | Maintenance |

***The Extent of Relief Sought, and Reasons for Seeking the Exemption.***

14 CFR Part 21, Subpart H. Part 21 establishes the procedures for issuance of certificates of airworthiness, as mandated by 49 U.S.C. § 44704. Under Section 333 and 49 U.S.C. § 44701(b), the FAA may exempt aircraft from airworthiness certification. The petitioner requests an exemption from the requirements of this Part because the size, weight, speed, operational capability and proximity to airports in which the Subject UAS pose significantly less of a risk that the risks posed by conventional aircraft. Manned aircraft pose risks to the life and safety of the crew; that is not a consideration with the Subject UAS. Risks to third parties are also minimized given the lightweight and slow speed at which the Subject UAS would operate. Nor are there risks of fuel spillage or fire in the event of an accident. Thus Mr. Van Duren requests that the FAA waive the requirement that the Subject UAS, particularly the aircraft portion, require an airworthiness certificate.

**14 CFR Part 36.** FAR Part 36, Subparts A, F and 0, establish certain noise standards for certification of various aircraft types. Because the Subject UAS would not have an airworthiness certificate, and given its small size and negligible noise impact, the petitioner requests an exemption from FAR Part 36.

**14 CFR § 45.23.** FAR Part 45.23 establishes marking requirements for aircraft; paragraph (b) mandates that the registration number be displayed in letters not less than two inches in height. The Subject UAS is small enough that it cannot accommodate the type-size requirement. Accordingly, Mr. Van Duren requests an exemption from this part.

**14 CFR Part 61.** FAR Part 61 sets forth the certification requirements for pilots. SubpartEestablishestheprivilegesandlimitationsforholdersofaprivatepilotcertificate. The petitioner requests an exemption that would allow him to operate the Subject UAS for

compensation or hire as part of his aerial photography business for the reasons articulated in *In re Trudeau,* F A A Exemption No. 11138, and *In re Astraeus,* F A A Exemption No. 11062. Mr. Van Duren will operate the Subject UAS over property where the owner or owner's representative has requested that the operation occur. Furthermore, as a holder of a private pilot certificate, Mr. Van Duren is an Airman who meets the knowledge base and skill level for operating an UAS. He thus requests and exemption from the requirement that he hold a commercial pilot certificate and anything other than a Third Class Medical certificate or valid state-issued driver's license.

**14 CFR § 91.7.** Under FAR 91.7, no person may operate an aircraft unless it is in an airworthy condition. To the extent that "airworthy" is defined as requiring an airworthiness certificate, the petitioner would request an exemption from this FAR for the same reasons identified in his request for an exemption of 14 CFR Part 21, Subpart H. He will not, however, operate the Subject UAS if it is not in a condition for safe flight, as required under FAR 91.7(b).

**14CFR§91.9.** PetitionerrequestsexemptionfromtherequirementofFAR91.9,which requires that all aircraft have certain markings, placards and on-board flight manuals for the same reasons as stated in his request fro exemption under 14 CFR Part 21, Subpart H, and for a deviation from the marking requirements of 14 CFR Part 36, Subparts A, F, and 0.

**14 CFR § 91.103.** FAR 91.103 mandates certain pre-flight action. Petitioner will take all necessary pre-flight action, but requests an exemption from this requirement insofar as it is interpreted as requiring pre-flight actions appropriate to manned aircraft only (e.g., that flights be from an airport, etc.).

**14 CFR § 91.105.** FAR 91.105 mandates that crewmembers be at designated stations, have safety belts fastened, etc. Petitioner would be at a designated ground station for each mission, but requests an exemption to accommodate the fact that the Subject UAS is unmanned.

**14 CFR *§* 91.109.** This FAR requires that all flight instruction be conducted in aircraft that have dual controls, or throw-over controls, with an instructor. From time to time the petitioner will conduct his own refresher training, but requests an exemption insofar as this FAR would be interpreted to require that the ground control station have a second controller or dual- control capability.

**14 CFR *§* 91.119.** FAR 91.119 sets forth the minimum safe altitudes over various areas. Petitioner requests an exemption from this this FAR in order to accomplish the intended function of the mission for which he seeks an exemption.

**14 CFR § 91.121.** FAR 91.121 mandates various altimeter settings in order to maintain level flight. Petitioner requests and exemption from this FAR as the Subject UAS will not have an altimeter that matches the requirements of this FAR. Operations with the Subject UAS will, however, maintain altitude below the 300' AGL ceiling by the petitioner monitoring the altitude of the UAS and through the Subject UAS's ability to establish a flight zone that cannot exceed the ceiling.

**14 CFR § 91.151.** Petitioner requests an exemption from the VFR-flight fuel carrying requirements because the Subject UAS will operate on battery power. Operations with the Subject UAS will, however, maintain a five-minute reserve battery time.

**19 CFR § 91.173.** Petitioner requests an exemption from the IFR-clearance requirement for flights into controlled airspace. It is possible Mr. Van Duren may operate the Subject UAS in conditions that are IFR within controlled airspace (e.g., a flight on a day with less than three miles visibility in a neighborhood that falls within the Class D airspace of KBFI). He would request that, after contacting ATC for the controlled airspace, he would be allowed to operate in what might be IFR conditions, but where he still has complete and unfettered line of sight visibility with the Subject UAS.

**14 CFR § 91.203.** FAR 91.203 requires that a civil aircraft have an airworthiness certificate and a registration certificate. Mr. Van Duren requests that he be exempt from complying with this FAR insofar as it mandates issuance of an airworthiness certificate, for the reasons stated in his request for an exemption under 14 CFR Part 21, Subpart H.

**14 CFR § 91.207.** FAR 91.207 prohibits operation of a US-registered aircraft unless it is equipped with an emergency locator transmitter. Given the limited distance of flights of the Subject UAS, Mr. Van Duren requests and exemption from this FAR.

**14 CFR Part 91, Subpart E.** FAR 91, Subpart E requires that owners or operators of aircraft have the aircraft inspected at certain intervals, and by certain mechanics. Petitioner requests an exemption from this Subpart because the Subject UAS has a trouble-shooting and maintenance program that is best executed by the owner/operator, and is simply different from the maintenance of manned aircraft. Petitioner will, however, maintain a maintenance log and any maintenance records of repair of the Subject UAS.

***Public Interest and Benefit Considerations.***

Aerial imaging services generally require use of a manned platform. Close-proximity aerial photography is difficult to do, and usually requires the use of a helicopter or slow-moving aircraft at an appropriate distance over a populated area. The operation must be conducted in VFR conditions, and adds aircraft in congested airspace.

By using the Subject UAS, Mr. Van Duren aims to provide the public with quality aerial photography services at a fraction of the cost involved with manned flight. Furthermore, the risks inherent with manned flight are significantly reduced where the aircraft conducting the operation is less than five pounds, remains below 300' AGL, and can operate within a very confined cylinder on or directly over the location being photographed. Finally, as a certificated airman, he has the knowledge and experience to conduct a safe, efficient flight operation in furtherance of his primary occupation. Thus the public will be better served by having more affordable aerial imaging options available, and through an operation that is being conducted by an FAA-certificated airman.

***Why the Exemptions Would Not Adversely Affect Safety.***

The proposed operations will not adversely affect safety for four primary reasons.

First, the operations will be conducted in airspace where there is typically no activity among other users of the NAS. Flights are limited to property over which the owner has requested that the Subject UAS operate, so the owners will be aware of the flight operation. As a pilot himself, Mr. Van Duren fully recognizes the dangers that a small UAS could pose to all types of manned aircraft. The operations he is proposing to undertake pending approval of this Exemption Request are operations where manned aircraft will not fly. There would be a rigid separation between where a manned aircraft can fly (particularly due to FAR 91.119 which establishes minimum safe altitudes, to include an absolute prohibition of operating an aircraft within 500' of any structure) and where Mr. Van Duren would operate the UAS.

Second, the Subject UAS is simply not a large aircraft. Weighing in at a maximum of five pounds fully loaded, the likelihood that it would damage property or injure a person is not low, even in the event of a mishap. Furthermore, aerial imaging is still something done via manned aircraft, and the risk there is at least equal to the risk posed by the proposed operation.

Third, the Subject UAS has inherent lost-link capabilities to bring it back to its operating base for each mission. It is a redundant system for a more foreseeable problem that could arise.

Fourth, the Subject UAS will be operated only by the petitioner. Mr. Van Duren is a certificated pilot with sufficient flight time and experience with the aircraft to conduct a reasonably safe operation.

***Language for Inclusion in the Federal Register.***

Mr. Van Duren proposes that the following language be included in the Federal Register:

*Petition for Exemption.*

*Federal Aviation Regulations from which Petitioner seeks exemption: 14 CFR 14 CFR Part 21, Subpart H; Part 36; § 45.23; Part 61; §§ 91.* 7; *91.9; 91.103; 91.105; 91.109; 91.119; 91.121; 91.151; 91.173; 91.203; 91.207; and 14 CFR Part 91, Subpart E.*

*Description of Relief Sought: The petitioner is seeking an exemption from the above-referenced Federal Aviation Regulations to conduct aerial photography and data collection using a light, unmanned aerial vehicle for real estate and agricultural sensing purposes in the California central coast area.*

***Conclusion.***

Mr. Van Duren thanks the FAA for considering his request. Please contact the petitioner should there be a need for additional information.

Respectfully Submitted,

Drew F. Van Duren

Petitioner

**Exhibit A: Components of the Subject UAS, Nomenclature and Operating Instructions**

The following list identifies components of the subject UAS per the Phantom 2 Vision Plus Operating Manual (current version is V1.8, dated Jan. 2015) and additional, extra components procured for its use.

| # | Item – (Description) |
|---|---|
| 1 | **UAS** – Subject UAS possesses an integrated, but replaceable gimbal and camera |
| 2 | **Propeller Pairs (4)** – All are self-tightening – 2 tighten Clockwise, 2 tighten Counter-Cockwise |
| 3 | **Micro-SD Card** – Inserted in the aircraft Micro-SD Slot |
| 4 | **Lens Cap** – Lens cover for integrated HD camera |
| 5 | **Gimbal Clamp** – Attached to gimbal to prevent pan/tilt motions when not flying |
| 6 | **Propeller Wrench** |
| 7 | **Remote Control** – Includes holder for Mobile Device and WiFi range extender. Remote control unit possesses self-contained, rechargeable batteries |
| 8 | **DJI Smart Flight Battery –** Lithium-Ion battery, rechargeable and removable from the aircraft |
| 9 | **Charger –** Charger for DJI Smart Flight Battery. Adaptive to 110-240 Volt input charge voltage. |
| 10 | **Power Cables** – Cables for Charger |
| 11 | **Plug Adapters –** Adapters for international support |
| 12 | **Micro-USB Cable** – Used for 1) Connecting subject UAS to computer for firmware updates, 2) Charging range extender, and 3) Connecting to Phantom 2 Vision Plus camera payload for downloading imagery. |
| 13 | **Manuals –** Includes: Disclaimer, Phantom Pilot Training Guide, Phantom 2 Vision + Quick Start Guide and Manual |
| 14 | **Stickers** |
| 15 | **Anti-Drop Kit** |
| 16 | **Spare Screws –** Motor and body fastening screws |
| 17 | **Landing Pad –** Foam mounts to cushion the landing gear |
| 18 | **Propeller Guards** - (not included with original aircraft) Add-on propeller guards provide extra protection to rotating propellers in the event of an external object or ground strike. |

**<u>Phantom 2 Vision + Operations (per Phantom 2 Vision + Quick Start Guide)</u>**

The following instructions are from the subject UAS Quick Start Guide. Explanatory details may be found in the latest Phantom 2 Vision+ User Manual. Current version is 1.8, dated January, 2015[1] which is consistent with the latest firmware versions.

1. Start
   - View tutorials: http://www.dji.com/phantom2visionplus/training
   - Search DJI Vision* in the App Store or Google Play. Download, then launch and register for a DJI account.
   - Ensure the Smart Flight Battery, Range Extender and Remote Control are fully charged
   - ***Important: For SAFETY reasons please watch the tutorials, read the disclaimer and manuals thoroughly before using this product***
     - ***DJI VISION App supports the Phantom 2 Vision and the Phantom 2 Vision+. It is compatible with iOS and Android devices***
     - ***See steps 3, 4, 5 for checking battery levels. Refer to user manual for charging.***

2. Preparing Phantom 2 Vision +
   - Remove the gimbal clamp, the lens cap and the four warning cards from motors
   - Screw the propellers, clockwise for grey nuts and anti-clockwise for black nuts, onto the four motors. Be sure to match the black propeller nuts with the black dot motors
   - Make sure your Smart Flight Battery and Micro-SD card are inserted correctly
   - ***Important: Remove gimbal clamp before powering on.***

3. Preparing Remote Control
   - Twist the Mobile Device Holder to face outwards and fix in position
   - Be sure S1 and S2 are stitched to the upper most position. Push the Power Switch to the right to power on the Remote Control. The LED will go green if the Remote Control is functioning. The Battery Level Indicators display the current battery level.
   - ***Important: A red blinking and a continuous beeping from the Remote Control indicate LOW BATTERY VOLTAGE. Recharge the Battery when there is only one LED blinking.***

4. Powering On Smart Flight Battery
   - Press the circular power button once, then press again and hold for 2 seconds to power on the Smart Flight Battery
   - Rear LED Flight Indicators light up to indicate flight status:
     - Slow Green Flashing. Ready to Fly (GPS)
     - Slow Yellow Flashing. Ready to Fly (Non-GPS)
     - Fast yellow flashing. Remote control signal lost.
     - Fast red flashing. Smart Flight Battery level warning.
   - ***Important:***
     1. ***Press circular power button once to check battery level***

[1] http://download.dji-innovations.com/downloads/phantom_2_vision_plus/en/Phantom_2_Vision_Plus_User_Manual_v1.8_en.pdf

2. ***Front LEDs light up until motors start up***
3. ***Refer to the LED Flight Indicator card attached or user manual for more details***

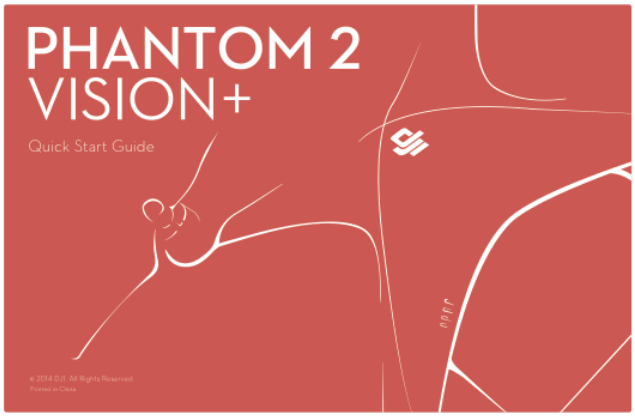
5. Powering On Range Extender/Linking Camera
   - Toggle power switch to ON position. SYSTEM Indicator will blink green to show normal operation
   - Enable Wi-Fi on your mobile device then select Phantom_XXXXXX from Wi-Fi network list.
   - Tap **CAMERA** icon in the DJI VISION App for a live camera view to ensure the camera is linked, then clip your mobile device into the Mobile Device Holder
   - ***Important:***
     1. ***If the POWER indicator is red, this means battery level is low. Charge your Range Extender by Micro-USB cable.***
     2. ***Only if both Range Extender and Smart Flight Battery are powered on, you will be able to link the camera.***

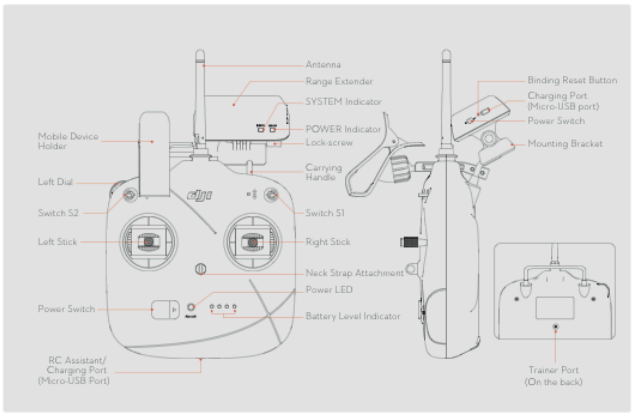
6. Calibrating Compass
   - Always calibrate compass before your flight
   - Step 1: To enter calibration mode, flip S1 switch rapidly from top to bottom 5 times
   - Step 2: Hold Phantom horizontally then rotate
   - Step 3: Hold aircraft vertically with nose pointing to the ground, rotate 360 degrees around the center axis until Rear LED Flight indicators resume normal blinking patterns.
   - If rear LED Flight Indicators blink red and yellow, calibration has failed. Re-calibrate by repeating Step 1-3 until normal blinking begins.

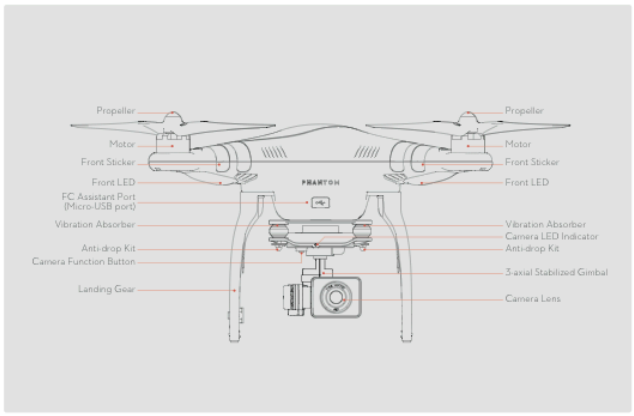
7. Remote Control Settings
   - The Remote Control is by default set to Mode 2 (left hand controls throttle)
   - ***Important: You can use PHANTOM RC Assistant to switch it to Mode1 (right hand controls throttle)***

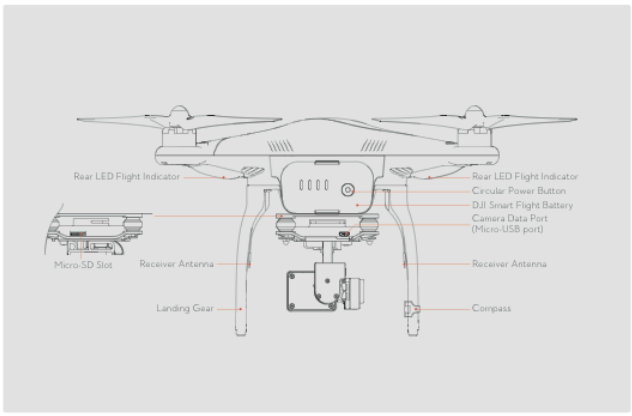
8. Taking off (Outdoors)
   - Place the Phantom 2 Vision+ on flat ground in an open space with Rear LED Flight Indicators facing you.
   - Power on the Remote Control, the Range Extender and the Smart Flight Battery mounted in Phantom 2 Vision+. Make sure that the DJI VISION App is working properly.
   - Start motors by pulling both control sticks to the bottom corners. Release sticks once motors start.
   - Wait until Rear LED Flight Indicators go from a slow yellow blinking to a slow green, indicating GPS locked.
   - Slowly push the left (throttle) stick up to take off.
   - ***Important:***
     1. ***Beginner flyers are recommended to only fly when the slow green flashes***
     2. ***Rear LED Flight Indicators will go from slow yellow flashing to slow green flashing if more than 6 GPS satellites have been found.***
     3. ***Never stop the motors during flight***

9. Landing (Outdoors)
    - Pull down the throttle stick to descend. The stick will lock into place and the aircraft will descend steadily.
    - When landing on the ground, pull both sticks to bottom corners to stop motors.
    - Press the circular power button once, then press again and hold for 2 seconds to power off the Smart Flight Battery. Turn off the Remote Control and Range Extender.
    - ***Important:***
        1. ***Land only on flat ground in open spaces.***
        2. ***Stop motors immediately after landing.***



# PHANTOM 2 VISION+

## Quick Start Guide

### 1 Start

- View tutorials:
  **http://www.dji.com/phantom2visionplus/training**
- Search **DJI VISION*** in the App Store or Google Play. Download, then launch and register for a DJI account.

Tutorials

App Store iOS 6.1+ | Google play Android 4.0+

- Ensure the Smart Flight Battery, Range Extender and Remote Control are fully charged.**

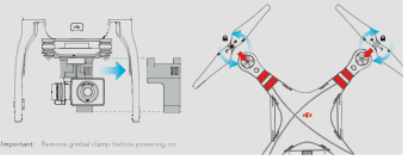
**Important:** For SAFETY reasons please watch tutorials, read the disclaimer and manuals thoroughly before using this product.

* DJI VISION App supports the Phantom 2 Vision and the Phantom 2 Vision+. It is compatible with iOS and Android devices.

** See step 4 5 6 for checking battery levels. Refer to user manual for charging.

### 2 Preparing Phantom 2 Vision +

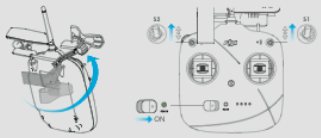
- Remove the gimbal clamp, the lens cap and the four warning cards from motors.
- Screw the propellers, clockwise for grey nuts and anti-clockwise for black nuts, onto the four motors. Be sure to match the black propeller nuts with the black dot motors.
- Make sure your Smart Flight Battery and Micro-SD card are inserted correctly.



**Important:** Remove gimbal clamp before powering on.

### 3 Preparing Remote Control

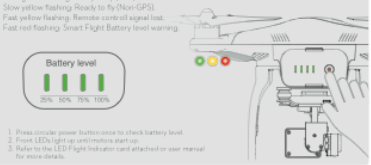
- Twist the Mobile Device Holder to face outwards and fix in position.
- Be sure S1 and S2 are switched to the upper most position. Push the Power Switch to the right to power on the Remote Control. The LED will go green if the Remote Control is functioning. The Battery Level Indicators display the current battery level.




**Important:** A red blinking and a continuous beeping from the Remote Control indicate LOW BATTERY VOLTAGE. Recharge the Battery when there is only one LED remains blinking.

### 4 Powering On Smart Flight Battery

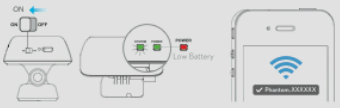
- Press the circular power button once, then press again and hold for 2 seconds to power on the Smart Flight Battery.
- Rear LED Flight Indicators light up to indicate flight status:
  - Slow green flashing: Ready to fly (GPS).
  - Slow yellow flashing: Ready to fly (Non-GPS).
  - Fast yellow flashing: Remote control signal lost.
  - Fast red flashing: Smart Flight Battery level warning.




**Important:**
1. Press circular power button once to check battery level.
2. Front LEDs light up until motors start up.
3. Refer to the LED Flight Indicator card attached or user manual for more details.

### 5 Powering on Range Extender/Linking Camera

- Toggle power switch to ON position. SYSTEM Indicator will blink green to show normal operation.
- Enable Wi-Fi on your mobile device then select Phantom_XXXXXX from Wi-Fi network list.
- Tap **CAMERA** icon in the DJI VISION App for a live camera view to ensure the camera is linked, then clip your mobile device into the Mobile Device Holder.




**Important:**
1. If the POWER indicator is red, this means battery level is low. Charge your Range Extender by Micro-USB cable.
2. Only if both Range Extender and Smart Flight Battery are powered on, you will be able to link the camera.

### 6 Calibrating Compass

- Always calibrate compass before your flight.
- Step1 :
  To enter calibration mode, flip SI switch rapidly from top to bottom 5 times or until Rear LED Flight Indicators turn solid yellow.
- Step 2:
  Hold Phantom horizontally then rotate 360°around the center axis until Rear LED Flight Indicators go green.
- Step3:
  Hold aircraft vertically with nose pointing to the ground, rotate 360° around the center axis until Rear LED Flight Indicators resume normal blinking patterns.
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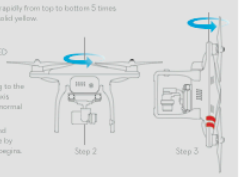
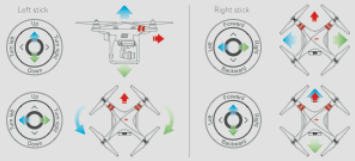



### 7 Remote Control Settings

Nose pointing direction

- The Remote Control is by default set to Mode 2 (left hand controls throttle).

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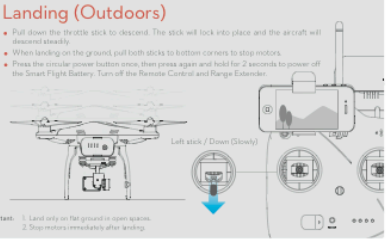


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