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

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

May 5, 2015

Exemption No. 11469
Regulatory Docket No. FAA–2015–0236

Mr. William B. Bispeck
Independent Contractor/Consultant
Turner Industries−Integrated Solutions Group Houston Office
3850 Pasadena Boulevard
Pasadena, TX 77053

Dear Mr. Bispeck:

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.

The Basis for Our Decision

By letter dated January 28, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Turner Industries Group, L.L.C. (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct aerial photography, surveys, and assessments of industrial facilities, and construction sites.

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. 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, Turner Industries Group, L.L.C. 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, Turner Industries Group, L.L.C. 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 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 April, 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

January 28, 2015

Docket Operations, M-30
U.S. Department of Transportation (DOT)
1200 New Jersey Avenue, SE
Room W12-140, West Building Ground Floor
Washington, D.C. 20590-0001

Subject: Petition to the FAA for Section 333 Exemption

Dear Sir or Madam,

Turner Industries Group, L.L.C. hereby submits to the Federal Aviation Administration, pursuant to the FAA Modernization and Reform Act of 2012, an exemption petition, in accordance with Section 333 of the Act.

This letter provides requested information as listed in the FAA's "Public Guidance for Petitions for Exemptions Filed under Section 333" as described as of this date at the FAA website at https://www.faa.gov/uas/legislative_programs/section_333/how_to_file_a_petition/

Turner Industries Group, L.L.C. Background:

Serving the Petrochemical, Chemical, Refining, Energy, Power Generation, Pulp & Paper and related industries, Turner Industries has built its reputation as a world class industrial contractor on safety, integrity, reliability, and project execution.

Turner Industries has provided a single vendor solution in heavy industrial construction, maintenance, pipe, module and vessel fabrication, equipment, rigging and heavy hauling, and associated specialty services for over 50 years.

The company is privately owned by the Turner family, and headquartered in Baton Rouge, Louisiana. Turner Industries has facilities in Port Allen, Sulphur and New Orleans, Louisiana; Houston, Beaumont, Corpus Christi and Paris, Texas; and Decatur, Alabama, and works throughout the United States and abroad.

Client recognition of our performance has consistently ranked us among the top industrial construction and maintenance service companies. We do a lot of things, but all with one purpose - helping our clients become more successful. More company information can be viewed at the company website at http://www.turner-industries.com/ .

Purpose for the Exemption

Turner Industries Group, L.L.C. desires to utilize an unmanned aircraft system (UAS), herein described, to accomplish aerial photography, surveys and assessments of industrial facilities and construction sites.

Contact Information:

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List of Specific Sections of 14 CFR for which exemption is sought:

This listing matches the list on page 7 of the FAA's "Public Guidance for Petitions Filed under Section 333", Rev. 9/25/2014.

14 CFR 21, Subpart H –Airworthiness Certificates

14 CFR 61.113(a) and (b), Certification: Pilots, Flight Instructors, and Ground Instructors

14 CFR 91.7 (a), Airworthiness required for operation

14 CFR 91.103 (b) (2), Preflight action

14 CFR 91.105, Flight crewmembers at stations

14 CFR 91.109, Flight instruction

14 CFR 91.119 (c), Minimum safe altitudes

14 CFR 91.121, Altimeter settings

14 CFR 91.151, Fuel requirements for flights in VFR conditions

14 CFR 91.405 (a), Maintenance required

14 CFR 91.407 (a) (1), Operation after maintenance

14 CFR 91.409 (a) (2), Inspections

14 CFR 91.417 (a) and (b), Maintenance records

(See pages 8 through 10 for further details)

In accordance with the outline given in the FAA's "Public Guidance for Petitions Filed under Section 333", the following information is provided for each numbered item listed in that guidance:

1. Aircraft Description

Design and Operational Characteristics:

Turner plans to operate a Phantom 2 Vision+ comprised of an unmanned aircraft and a transportable ground station. This aircraft is a quad-copter design with gross weight (battery and propellers included) of 1242 g (2.74 lbs.).

The Phantom 2 Vision+ has an integral lightweight camera for capturing aerial still photographs and videos.

It is equipped with four rotors that are driven by battery-powered electric motors. Maximum airspeed is 30 knots.

The Phantom 2 Vision+ is equipped with a built-in Flight Control System which includes an integral inertial sensor and a barometric altimeter that measure both attitude and altitude. Included is a shielded, anti-static compass which reads geomagnetic information and assists in accurately calculating position and altitude.

The Flight Control System includes a Failsafe Function. It activates if the Remote Control is powered off, the Phantom has flown outside effective control range, the signal between the Phantom and the Remote Control is blocked, or if there is interference causing a signal problem. When activated, the Failsafe Function automatically flies the Phantom back to the Home Point (the start location) and lands it. If GPS mode is not active, Failsafe will execute a controlled descend and automatic landing.

Through the Phantom 2 Vision+ Assistant software, each flight operation will be programmed with a maximum radius distance and maximum altitude from the Home Point such that the flight control system will limit operations to within the confines of the property to be surveyed for Turner or Turner's Clients. These performance limitation requirements are included in the UAS Operating Procedure contained in Appendix A herein.

Manufacturer's Documentation:

Detailed manufacturer's design information (current to this date) is contained the in the following manuals in the appendices at the end of this document:

- Appendix B – Phantom 2 Vision+ Specifications
- Appendix C – Phantom 2 Vision+ Quick Start Guide
- Appendix D – Phantom 2 Vision+ User Manual V1.6
- Appendix E – Phantom 2 Vision+ Pilot Training Guide

For ease of reference, the Phantom 2 Vision+ is included in FAA Section 333 Exemption No. 11138 granted on January 5, 2015 to Douglas Trudeau, Realtor®.

2. Procedures for Ensuring UAS Is In a Condition Safe for Flight

Preflight Checks: As a minimum, the following items will be checked prior to initiating any operation. (See Appendix A in this document for detailed procedures, Turner Procedure UAS-001.)

- ☐ Operations must be in daylight hours and under visual meteorological conditions (VMC).
- ☐ Area to be surveyed is defined on a plot plan drawing with path of flight and altitudes for each leg of the flight clearly marked.
- ☐ Flight path is at least 500 ft. from all non-participating persons, vessels, vehicles and structures unless protective barriers or structures are present, or permission is granted, or such operations present no hazard to the Pilot in Command, the Visual Observer, trainees, and other essential persons.
- ☐ Flight plan and schedule has been reviewed with site leadership and communicated to all Turner and Client personnel in the area.
- ☐ Remote control, smart battery, range extender, and smart phone are fully charged.
- ☐ Propellers are mounted correctly.
- ☐ Gimbal clamp has been removed.
- ☐ Damping absorbers are in good condition, not broken or worn.
- ☐ Anti-drop kits have been mounted correctly.
- ☐ Camera lens cap has been removed.
- ☐ Micro-SD card has been inserted.
- ☐ Gimbal is functioning as normal.
- ☐ DJI Vision app can connect to the camera.
- ☐ Compass has been calibrated.
- ☐ Flight radius and altitude limits have been set with the Phantom 2 Vision+ Assistant software, not to exceed 400 ft. AGL altitude, and radius limited to the property boundaries of Turner or Turner Client site.
- ☐ The Visual Observer (VO) is stationed at the required initial observation point according to the flight plan and in view of the Pilot in Command (PIC) and has means for continual verbal communication.
- ☐ There are no inoperable components.
- ☐ All site required safety permits are approved in in possession of the PIC.
- ☐ A Notice to Airmen (NOTAM) has been requested not more than 72 hours in advance and not less than 48 hours prior to the operation.
- ☐ Motors can start and function as normal.
- ☐ Flight Indicator Lights on the aircraft verify that the Home Point is set to current location.
- ☐ Record the Preflight Check, date and sign, and file it in the Equipment Inspection and Maintenance Record Book.

3. Radio Frequency (RF) Spectrum For Control

The Remote Control ground station operating frequency is 5.278 – 5.85 GHz and is FCC compliant with communication distance in an open area of 800 m (875 yds.)

Operating Frequency	5.728 GHz—5.85 GHz
Communication Distance (open area)	FCC Compliance: 800m
Receiver Sensitivity (1%PER)	-93dBm
Transmitter Power	FCC Compliance: 100mW
Working Voltage	120 mA@3.7V
Built-in LiPo Battery Working Current/Capacity	3.7V, 2000mAh

4. Qualifications For The Pilot in Command (PIC)

Certifications: Operations will be conducted by a Pilot in Command (PIC) possessing at least a private pilot certificate and at least a current third-class medical certificate.

Logged Hours: Prior to operations the PIC will have accumulated and logged a minimum of 25 hours of total time as a UAS rotorcraft pilot including at least 10 hours logged as a UAS pilot with a multi-rotor UAS. Training, proficiency, and experience-building flights in dedicated training sessions will be included in the accumulated and logged hours.

Currency: Prior to operations, the PIC will have accumulated and logged a minimum of 5 hours as UAS pilot specifically operating the Phantom 2 Vision+. The PIC will have accomplished, during dedicated training sessions, 3 take-offs and landings in the preceding 90 days (for currency purposes).

Emergency and Evasive Maneuvers: The PIC will have demonstrated the ability to safely operate the Phantom 2 Vision+ in a manner consistent with how it will be operated in surveying Turner and Turner Client properties, including evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles and structures. The logged hours reference above will document this.

5. Medical Standards And Certification Of The PIC

As described above, in “4. Qualifications for the Pilot in Command (PIC)”, the PIC will possess at least a current third-class medical certificate.

6. Description Of Intended UAS Operations

Operations will be restricted to Class G airspace.

No operations will occur within 5 miles of a non-towered airport reference point as denoted on a current FAA-published aeronautical chart, unless a letter agreement with the airport’s management

is obtained, and the operation is conducted in accordance with a Notice to Airman (NOTAM) as required by the Certificate of Waiver or Operation (COA).

The Phantom 2 Vision+ will be utilized to survey construction sites and industrial facilities in Petrochemical, Chemical, Refining, Energy, Power Generation, Pulp & Paper industries. The use of small unmanned aircraft systems provides more immediate and thorough information than is presently available by other means. In some circumstances scaffolds are otherwise erected to accomplish personnel access for inspections of areas very difficult to view from the ground or from existing stairways, ladders, platforms, and from protective enclosures lifted by cranes. Expense for scaffolding, rental of manned aircraft, rental of equipment, and lost time is saved. Safety is improved by reducing fall risk for workers and reducing potential for manned aircraft accidents.

As described in "2. Procedures for Ensuring UAS Is in a Condition Safe for Flight", altitude and distance limits will be entered into the Flight Control System prior to commencement of flight. This will restrict the operation to the Turner or Turner Client property. The Failsafe Function integral with the Phantom 2 Vision+ will assure this aircraft stays within the area deemed safe for operation.

Industrial facilities of the type mentioned above have strict safety procedures which must be satisfied. Turner's respect for compliance with these procedures, and Turner's own safety performance record, are vital to assuring positive Client relationships and continuing business. All safety procedures for personnel and process safety will be strictly adhered to as well as all laws and regulations.

7. Proposed Speed, Altitude, Visibility And Distances

Speed: The Phantom 2 Vision+ is capable of a maximum speed of 15m/s (29.2 knots). In order to conserve power, and thereby maximize flight time, and to assure good quality still photographs and video, the Phantom 2 Vision+ will be operated at a slow speed along the flight path, typically 2m/s (3.9 knots) or below. Higher speeds may be used from time to time when traversing a section of the property of no interest and not included in a given study.

Altitude: Altitudes below 400 ft. AGL are adequate for the complete range of facilities and structures to be surveyed. The integral Flight Control System will be set to limit the altitude to always be below that level.

Distances: The integral Flight Control System will be set to limit the radial distance from the Home Point (point of flight commencement) such that the Phantom 2 Vision+ will stay within the boundary of the property lines. The PIC will operate the equipment to assure those limits are not reached and will maneuver the Phantom 2 Vision+ to follow the preplanned flight path within the property boundaries.

The Phantom 2 Vision+ will not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud when visibility is less than 3 statute miles from the PIC.

Operations will be aborted immediately if the PIC encounters unpredicted obstacles or emergencies. Safe descent and landing procedures will be followed in accordance with operating documents.

8. Description Of The Area Of Intended Operations

As described in "6. Description of Intended UAS Operations", the Phantom 2 Vision+ operation will be restricted to Turner or Turner Client property and not taken into public areas. Turner and Client personnel on the site will be made fully aware of the operation prior to commencement of operations.

9. Proximity Of Airports

Operations will be restricted to Class G airspace.

No operations will occur within 5 miles of a non-towered airport reference point as denoted on a current FAA-published aeronautical chart, unless a letter agreement with the airport's management is obtained, and the operation is conducted in accordance with a Notice to Airman (NOTAM) as required by the Certificate of Waiver or Operation (COA).

10. Operation Within Visual Line-of-Sight (VLOS)

In addition to the Pilot in Command (PIC), all operations will include a Visual Observer (VO). The VO will assure that the Phantom 2 Vision+ is always within their visual line-of-sight (VLOS), as well as the PIC's, at all times. The VO and the PIC will be able to communicate verbally at all times utilizing two-way radios available at Turner and Turner Client sites.

11. Procedures For Preflight Safety Assessment

Prior to each flight, the PIC will inspect the Phantom 2 Vision+, including the ground control station, in accordance with the Preflight Checklist (see "2. Procedures for Ensuring UAS Is In a Condition Safe for Flight"). If the Preflight Check indicates any unsafe conditions or a non-functioning safety-critical part, the flight will not commence until the needed maintenance is performed and a satisfactory Preflight Check can be completed. All maintenance and alterations performed will be documented and filed in the Equipment Inspection and Maintenance Record Book.

12. Notifications

In accordance with the COA, a Notice to Airmen (NOTAM) will be requested not more than 72 hours in advance and not less than 48 hours prior to an operation.

In addition, any notifications required by the FAA Flight Standards District Office will be made.

13. Certificate Of Waiver Or Authorization (COA)

Prior to conducting any operations, an Air Traffic Organization (ATO) issued Certificate of Waiver or Operation (COA) will be obtained for each aircraft. Services will start with one aircraft, with additional units added as needs for operations increase over time. Each Phantom 2 Vision+ aircraft will be identified with its 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 will be as large as practicable.

Specific Regulations for Which Exemption is Sought:

1. **14 CFR 21, Subpart H –Airworthiness Certificates**

   Part 21 covers certification procedures for products and parts. Subpart H specifies requirements for Airworthiness Certificates for various aircraft types. Small unmanned aircraft systems are not specifically called out and addressed in these rules.

   Turner will, in lieu of airworthiness certification by aforementioned rule, if exemption is granted, ensure that the Phantom 2 Vision+ system is in compliance with its operating documents as described herein. The PIC will assure that all Preflight Checks are completed and documented and thee is full compliance with all manufacturer's operation and maintenance documents.

   Due to consideration of the size, weight, speed, and limited operating area associated with Turner's proposed Phantom 2 Vision+, we believe it will not create a hazard to users of the National Airspace System (NAS) or the public. Therefore, a request is made for exemption from 14 CFR part 21, and any associated noise certification and testing requirements of part 36.

2. **14 CFR 61.113(a) and (b), Certification: Pilots, Flight Instructors, and Ground Instructors**

   14 CFR 61.113 (a) and (b) prohibit private pilots from fulfilling the role of PIC if the aircraft is carrying property for compensation, unless the flight is only incidental to that business or employment.

   Turner believes that due to the size, weight, speed, and limited operating area associated with Turner's proposed Phantom 2 Vision+ operation, a PIC possessing a private pilot certificate and a current third-class medical certificate, and also having the aforementioned training and logged hours, would ensure safety and prevent creating any hazard to users of the National Airspace System (NAS) or the public. We therefore request an exemption from these parts of 14 CFR.

3. **14 CFR 91.7 (a), Airworthiness required for operation**

   If the exemption from 14 CFR 21, Subpart H (item 1 above) is granted, no airworthiness certificate will be required. On this basis, exemption from 14 CFR 91.7 (a) is requested, presuming that airworthy condition by definition in the rule means having an airworthiness certificate. Turner will, in lieu of airworthiness certification by 14 CFR 21, ensure that the Phantom 2 Vision+ system is in compliance with its operating documents as described herein. The PIC will assure that all Preflight Checks are completed and documented and execute full compliance with all manufacturer's operation and maintenance documents.

4. **14 CFR 91.103 (b) (2), Preflight action**

   14 CFR 91.103 (b) (2) specifies that the PIC be familiar with aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature.

Since the Phantom 2 Vision+ will not be operating out of airports this rule is not applicable. On this basis, and on the basis that the operating documents cover requirements for operation safety, an exemption from this rule is requested.

5. 14 CFR 91.105, Flight crewmembers at stations

This part requires certain actions by onboard crewmembers. Since the Phantom 2 Vision+ is unmanned, an exemption from this rule is requested.

6. 14 CFR 91.109, Flight instruction

14 CFR 91.109 describes requirements for flight instruction and requires that the aircraft used for flight instruction have fully functioning dual controls. The details pertain to manned airplanes and are not applicable to a small unmanned aircraft system such as the Phantom 2 Vision+. Flight training will be required for the Phantom 2 Vision+ pilot as detailed on page 5 herein, "4. Qualifications for the Pilot in Command (PIC)." Compliance with these training requirements with logged hours, in combination with a private pilot's license and current third-class medical certificate, assure that the required competency for safely operating the Phantom 2 Vision+ will be maintained. On this basis an exemption from this rule is requested.

7. 14 CFR 91.119 (c), Minimum safe altitudes

14 CFR 91.119 (c) requires that no operation is permitted below 500 feet above the surface, except over open water and sparsely populated areas. The proposed use of the Phantom 2 Vision+ is specifically for altitudes that range from the surface to maximum 400 feet AGL. On the basis of the aforementioned safety procedures, we believe there will be no increased hazard to users of the National Airspace System (NAS) or the public will be created by the Phantom 2 Vision+ as detailed here.

8. 14 CFR 91.121, Altimeter settings

14 CFR 91.121 provides specific rules for altimeter settings for cruising altitude and flight level of aircraft and speaks of altimeter stations along the route and the elevation of the departure airport. In lieu of these specific requirements, most suitable for manned airplanes, the Phantom 2 Vision+ has barometric altimeter and GPS derived altitude capabilities. All altitudes reported to Air Traffic Control (ATC) will be in feet above ground level (AGL). On this basis, an exemption from this rule is requested.

9. 14 CFR 91.151, Fuel requirements for flights in VFR conditions

14 CFR 91.151(a) requires that no person may begin a flight under Visual Flight Rule (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 Phantom 2 Vision+ has a built-in Low Battery Level Warning Function:

(1) If the smart battery is depleted to the point that may affect the safe return of the aircraft, the low battery level warning notifies the PIC to take action.
(2) The thresholds for these warnings are automatically determined based on the current aircraft altitude and its distance from the Home Point.
(3) A color coded battery level indicator shows battery level, and an estimated remaining flight time in minutes is displayed.
(4) When the critical battery level warning activates, the aircraft will gradually descend and land automatically.

As standard operating procedure, the PIC will immediately return the Phantom 2 Vision+ to the Home Point for a battery swap when the battery level reaches 25%.

On the basis of these specific safety features of battery power level monitoring, and operating procedures, an exemption from this rule is requested.

10. 14 CFR 91.405 (a), Maintenance required

Please see exemption request explanation in item 15 below (14 CFR 91.417).

11. 14 CFR 91.407 (a) (1), Operation after maintenance

Please see exemption request explanation in item 15 below (14 CFR 91.417).

12. 14 CFR 91.409 (a) (2), Inspections

Please see exemption request explanation in item 15 below (14 CFR 91.417).

13. 14 CFR 91.417 (a) and (b), Maintenance records

Parts 91.405 (a), 91.407 (a) (1), 91.409 (a) (2), and 91.417 (a) and (b), contain requirements for maintenance of larger aircraft. In lieu of adapting these rules for the Phantom 2 Vision+, Turner is requesting an exemption on the basis that it will inspect the Phantom 2 Vision+ and ensure that it is in a condition for safe flight prior to beginning any operation. We propose that adherence to the operating documents describing the requirements for maintenance, inspection, and recordkeeping, are sufficient to ensure that safety is not adversely affected.

PUBLIC BENEFIT

Granting this Section 333 Exemption would benefit the public in the following ways:

- Public Safety: Common practice for industrial facility construction projects and periodic site-wide industrial facility visual assessment involves utilization of manned aircraft. The potential risk to life and property is order of magnitudes less for use of a small unmanned aircraft system as compared to conventional aerial photography by manned fixed wing aircraft.
- Industrial Safety: In order to accomplish inspections of difficult to access areas at high elevations requires either erection of scaffolding or lifting personnel by crane in protective enclosures to view the subject of interest. Fall protection gear and compliance with OSHA rules governing such work is crucial for life safety. The ultimate protection, however, would be to not involve personnel in such activity and instead complete this work with an unmanned aircraft system.
- Energy Savings and Environmental Protection: Reduction of frequency of manned aircraft used to do aerial photography and surveys for construction sites and industrial facilities results in burning less fuel thereby saving energy and reducing emissions of combustion gases.

REASONS SAFETY NOT ADVERSELY AFFECTED AND IS AT LEAST EQUIVALENT TO EXISTING RULE

The key features of the proposed Phantom 2 Vision+ unmanned aircraft system that assure that safety to the public and safety of the National Airspace System (NAS) is not adversely affected are the following:

- Credentials and training for the Pilot in Command (PIC), along with detailed operating procedures, assure that the level of competency required for successful and safe flight operations is achieved.
- The built-in Flight Control System, which includes a Failsafe Function, assures proper flight control data feedback to the Pilot in Command (PIC), and immediate return to the Home Point and safe landing under failure scenarios, thereby preventing injury or damage.
- Visual Line-of-Sight (VLOS) operation provided by the PIC and the Visual Observer (VO), and their ability to communicate verbally at all times, assures full operational control.
- Detailed operations and maintenance procedures, including a Preflight Checklist, provide assurance of mechanical integrity and full functioning of Phantom 2 Vision+ unmanned aircraft system prior to commencement of any operation.

SUMMARY FOR PUBLICATION IN FEDERAL REGISTER

Petition for Exemption

Docket No.: FAA-2015-xxxx

Petitioner: Turner Industries Group, L.L.C.

Section of 14 CFR 14 CFR 21 Subpart H, 61.113(a) and (b), 91.7 (a), 91.103 (b) (2), 91.105, 91.109, 91.119 (c), 91.121, 91.151, 91.405 (a), 91.407 (a) (1), 91.409 (a) (2), 91.417 (a) and (b).

Description of Relief Sought: The petitioner is seeking an exemption to utilize an unmanned aircraft system (UAS) to accomplish aerial photography, surveys and assessments of industrial facilities and construction sites.

Respectfully Submitted,

William B. Bispeck

Independent Contractor/Consultant to

Turner Industries Group, L.L.C.

John H. Lindsey

General Manager – Integrated Solutions Group

Turner Industries Group, L.L.C.

Please direct correspondence to William Bispeck. Contact information is on page 2.

Appendix A

UAS Operating Procedure

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Procedure for Unmanned Aircraft System Operations			TURNER INDUSTRIES
Procedure Number	UAS-001	**Type**	Operation
Authored By	Bill Bispeck	**Revision Number**	0
Reviewed By	John Lindsey	**Next Review Date**	7-28-2015
Approved By	John Lindsey	**Approved Date**	1-28-2015

PURPOSE

The purpose of this procedure is to describe responsibilities and tasks required to safely and successfully operate a Phantom 2 Vision+ unmanned aircraft system to accomplish a mission to survey Turner or Turner Client construction sites or industrial facilities.

This is a **Critical Procedure** that requires sign off of the Preflight Checklist for safety and full compliance with all steps as required.

To properly use this procedure, personnel must be aware of safety related information contained in the Health, Safety, Environmental Precautions section of this document.

RESPONSIBILITIES

1. PILOT IN COMMAND (PIC):
    a. The Pilot in Command of the aircraft is directly responsible for, and is the final authority for the operation and safety of the flight.
    b. In an in-flight emergency requiring immediate action, the PIC may deviate from any rule or procedure to the extent required to meet that emergency in order to protect life and property.
    c. The PIC will assure that all Preflight Checks are completed and documented and execute full compliance with all manufacturer's operation and maintenance documents.
    d. The PIC will carry out the flight plan as agreed to and approved by site leadership.
    e. The PIC is responsible for maintaining Visual Line-of-Sight (VLOS) with the aircraft during operations by direct view with human eyesight.

2. VISUAL OBSERVER (VO):
    a. The Visual Observer is a trained person who assists the PIC with the duties associated with collision avoidance, including avoidance of traffic, clouds, obstructions and terrain.

b. The VO will maintain Visual Line-of-Sight (VLOS) with the aircraft at all times during operation.

c. The VO will travel to required locations on the site, as specified in the flight plan, and be able to communicate verbally with the PIC at all times during the operation.

HEALTH, SAFETY AND ENVIRONMENTAL PRECAUTIONS

3. Personnel Protective Equipment: The PIC and VO will at all times abide by local site safety rules regarding wearing of protective equipment. This typically consists of ANSI approved hard hats and safety glasses, but in many locations may also include fire resistant clothing (e.g. Nomex®) and safety shoes.
4. Hazard Communication: Toxic substances used in the work area must be disclosed to personnel under laws managed by OSHA. The UAS operation does not involve use of any hazardous materials. The site being surveyed may contain and process such materials. During the preflight planning meeting the PIC and VO should ask if there are any precautions required of them for personnel protection and comply with these. Material Safety Data Sheets (MSDS) should be available to aid in any awareness needed for specific substances.
5. Permits: In compliance with local site safety procedures all required permits must be obtained and approved. All safety and environmental requirements by those permits and referenced site procedures must be followed at all times.
6. Equipment Safety Inspection: Prior to each flight, the PIC will inspect the Phantom 2 Vision+, including the ground control station, in accordance with the Preflight Checklist to assure that the system is airworthy as determined by the PIC on the basis of these checks and manufacturer's documentation. If the Preflight Check indicates any unsafe conditions or a non-functioning safety-critical part, the flight will not commence until the needed maintenance is performed and a satisfactory Preflight Check can be completed.
7. Site Approval: No operations will start without review and approval of site leadership and communication of the site plan and schedule with site personnel.
8. Conditions: All operations must be in daylight hours and under visual meteorological conditions (VMC). No operations will be conducted less than 500 feet below or less than 2,000 feet horizontally from a cloud when visibility is less than 3 statute miles from the PIC.
9. Safe Power Levels: As standard operating procedure, the PIC will immediately return the Phantom 2 Vision+ to the Home Point for a battery swap when the battery level reaches 25%.
10. Collision Avoidance: Altitude and distance limits will be entered into the Flight Control System prior to commencement of flight. This will restrict the operation to the Turner or Turner Client property. The Failsafe Function integral with the Flight Control System will assure the aircraft stays within the area deemed safe for operation, as well as assure altitudes do not exceed 300 feet AGL. By the Visual Line-of-Sight (VLOS) method the PIC with assistance of the VO will assure the aircraft avoids any other possible traffic, with clouds, obstructions and terrain.

11. Proximity of Airports: Operations will be restricted to Class G airspace. No operations will occur within 5 miles of a non-towered airport reference point as denoted on a current FAA-published aeronautical chart, unless a letter agreement with the airport's management is obtained, and the operation is conducted in accordance with a Notice to Airman (NOTAM) as required by the Certificate of Waiver or Operation (COA).

12. Emergencies: Operations will be aborted immediately if the PIC encounters unpredicted obstacles or emergencies. Safe descent and landing procedures will be followed in accordance with operating documents.

13. Incident Reporting: Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA will be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents will be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov. Site leadership will be notified immediately as specified by local procedures.

14. Qualifications and Training: The PIC will have logged hours and certifications as described in the Qualifications for the PIC section of this procedure. The VO will be trained by the PIC regarding duty stations for the VLOS method as required by the flight plan and the procedures for verbal communication.

PREREQUISITES

15. Operation of the UAS cannot proceed without full compliance with

    a. Health, Safety and Environmental Precautions

    b. Qualifications for the Pilot in Command (PIC)

    c. Preflight Planning

    d. Preflight Checklist

    These are covered in the so-named sections of this document.

QUALIFICATIONS FOR THE PILOT IN COMMAND (PIC)

16. Certifications: Operations will be conducted by a Pilot in Command (PIC) possessing at least a private pilot certificate and at least a current third-class medical certificate.

17. Logged Hours: Prior to operations the PIC will have accumulated and logged a minimum of 25 hours of total time as a UAS rotorcraft pilot including at least 10 hours logged as a UAS pilot with a multi-rotor UAS. Training, proficiency, and experience-building flights in dedicated training sessions will be included in the accumulated and logged hours.

18. Currency: Prior to operations, the PIC will have accumulated and logged a minimum of 5 hours as UAS pilot specifically operating the Phantom 2 Vision+. The PIC will have accomplished, during dedicated training sessions, 3 take-offs and landings in the preceding 90 days (for currency purposes).

19. Emergency and Evasive Maneuvers: The PIC will have demonstrated the ability to safely operate the Phantom 2 Vision+ in a manner consistent with how it will be operated in surveying Turner and Turner Client properties, including evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles and structures. The logged hours reference above will document this.

PREFLIGHT PLANNING

20. Plan: A meeting with site leadership will be conducted to establish the purpose and objectives of the operation. Following that meeting, a path of flight over the Turner or Turner Client property to achieve the operation's objectives will be displayed on a site plot plan drawing showing

    a. Starting and ending points

    b. Required intermediate waypoints for hovering or change of direction

    c. Approximate altitudes along the flight path

    d. Areas of special interest to be surveyed

    e. Clearly marked obstructions or areas to avoid

    f. Station points for the PIC and VO at various stages of the operation

    g. Camera on and off points, angle of view, as well as still and video requirements along the flight path.

21. Walk Around: The PIC, the VO, and site leadership will walk the site in accordance with the above plan with the aim to observe any additional details that should be taken into account in the flight plan. The flight plan will then be adjusted accordingly.

22. Approval: This flight plan will be thoroughly reviewed with site leadership and signed off by both the PIC and site leadership.

PREFLIGHT CHECKLIST

23. Preflight Checks: As a minimum, the following items will be checked prior to initiating any operation. (A form to check off and document completion of these checks is included at the end of this procedure document.)
    a. Operations must be in daylight hours and under visual meteorological conditions (VMC).
    b. Area to be surveyed is defined on a plot plan drawing with path of flight and altitudes for each leg of the flight clearly marked.
    c. Flight path is at least 500 ft. from all non-participating persons, vessels, vehicles and structures unless protective barriers or structures are present, or permission is granted, or such operations present no hazard to the Pilot in Command, the Visual Observer, trainees, and other essential persons.
    d. Flight plan and schedule has been reviewed with site leadership and communicated to all Turner and Client personnel in the area.
    e. Remote control, smart battery, range extender, and smart phone are fully charged.
    f. Propellers are mounted correctly.
    g. Gimbal clamp has been removed.
    h. Damping absorbers are in good condition, not broken or worn.
    i. Anti-drop kits have been mounted correctly.
    j. Camera lens cap has been removed.
    k. Micro-SD card has been inserted.
    l. Gimbal is functioning as normal.
    m. DJI Vision app can connect to the camera.
    n. Compass has been calibrated.
    o. Flight radius and altitude limits have been set with the Phantom 2 Vision+ Assistant software, not to exceed 400 ft. AGL altitude, and radius limited to the property boundaries of Turner or Turner Client site.
    p. The Visual Observer (VO) is stationed at the required initial observation point according to the flight plan and in view of the Pilot in Command (PIC) and has means for continual verbal communication.

q. There are no inoperable components.

r. All site required safety permits are approved in in possession of the PIC.

s. A Notice to Airmen (NOTAM) has been requested not more than 72 hours in advance and not less than 48 hours prior to the operation.

t. Flight Indicator Lights on the aircraft verify that the Home Point is set to current location.

	**CAUTION**
	Flight of the UAS must not proceed unless the Home Point is set in the Flight Control System utilizing the manufacturer's procedures prior to flight. This will assure that the Fail Safe Function returns the aircraft to the PIC in case any of the failure scenarios are encountered.

u. Motors can start and function as normal.

v. Record the Preflight Check, date and sign, and file it in the Equipment Inspection and Maintenance Record Book.

TASKS AND STEPS

24. All operations will be conducted in accordance with the manufacturer's required procedures for safe flight. These requirements are specified in the following documents which will have been used to guide flight instruction for the PIC.
    a. Phantom 2 Vision+ Quick Start Guide
    b. Phantom 2 Vision+ User Manual V1.6
    c. Phantom 2 Vision+ Pilot Training Guide V1.1

EQUIPMENT INSPECTION AND MAINTENANCE

25. Preflight Inspection: In accordance with the Preflight Check procedure above, the PIC will complete a visual inspection and assessment of the aircraft and determine airworthiness. The Preflight Checklist Form will record each item listed to verify that it has been checked.
26. Record Keeping: Preflight Checklists will be signed and dated by the PIC and filed in an Equipment Inspection and Maintenance Record Book.
27. Acceptance: If the Preflight Check indicates any unsafe conditions or a non-functioning safety-critical part, the flight will not commence until the needed maintenance is performed and a satisfactory Preflight Check can be completed and the aircraft is accepted as airworthy by the PIC.

28. Repairs and Alterations:
    a. All maintenance, repairs, and alterations performed will be documented in detail with description of work, parts, names of repair persons, date, and will be filed in the Equipment Inspection and Maintenance Record Book.
    b. All repairs and alterations will be done in accordance with the manufacturer's published recommendations.

REFERENCES

- Phantom 2 Vision+ Specifications
- Phantom 2 Vision+ Quick Start Guide
- Phantom 2 Vision+ User Manual V1.6
- Phantom 2 Vision+ Pilot Training Guide

Preflight Checklist Form			TURNER INDUSTRIES
Checklist Number	UAS-001-01	**Type**	Operation
Authored By	Bill Bispeck	**Revision Number**	0
Reviewed By		**Next Review Date**	
Approved By		**Approved Date**	

Check each item as verified complete:

- ☐ Operations must be in daylight hours and under visual meteorological conditions (VMC).
- ☐ Area to be surveyed is defined on a plot plan drawing with path of flight and altitudes for each leg of the flight clearly marked.
- ☐ Flight path is at least 500 ft. from all non-participating persons, vessels, vehicles and structures unless protective barriers or structures are present, or permission is granted, or such operations present no hazard to the PIC, the VO, trainees, and other essential persons.
- ☐ Flight plan and schedule has been reviewed with site leadership and communicated to all Turner and Client personnel in the area.
- ☐ Remote control, smart battery, range extender, and smart phone are fully charged.
- ☐ Propellers are mounted correctly.
- ☐ Gimbal clamp has been removed.
- ☐ Damping absorbers are in good condition, not broken or worn.
- ☐ Anti-drop kits have been mounted correctly.
- ☐ Camera lens cap has been removed.
- ☐ Micro-SD card has been inserted.
- ☐ Gimbal is functioning as normal.
- ☐ DJI Vision app can connect to the camera.
- ☐ Compass has been calibrated.
- ☐ Flight radius and altitude limits have been set with the Phantom 2 Vision+ Assistant software, not to exceed 400 ft. AGL altitude, and radius limited to the property boundaries of Turner or Turner Client site.
- ☐ The Visual Observer (VO) is stationed at the required initial observation point according to the flight plan and in view of the Pilot in Command (PIC) and has means for continual verbal communication.
- ☐ There are no inoperable components.
- ☐ All site required safety permits are approved in in possession of the PIC.
- ☐ A Notice to Airmen (NOTAM) has been requested not more than 72 hours in advance and not less than 48 hours prior to the operation.
- ☐ Motors can start and function as normal.
- ☐ Flight Indicator Lights on the aircraft verify that the Home Point is set to current location.
- ☐ Record the Preflight Check, date, sign, file it in Equipment Inspection and Maintenance Record Book.

_____ _____ _____

PIC Printed Name PIC Signature Date

Appendix B

Phantom 2 Vision+ Specifications

1 page follows

(Source: http://www.dji.com/product/phantom-2-vision-plus/spec)

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Aircraft	Supported Battery	DJI 5200mAh LiPo Battery
	Weight (Battery & Propellers Included)	1242g
	Hover Accuracy (Ready To Fly)	Vertical: 0.8m; Horizontal: 2.5m
	Max Yaw Angular Velocity	200°/s
	Max Tiltable Angle	35°
	Max Ascent / Descent Speed	Ascent: 6m/s; Descent: 2m/s
	Max Flight Speed	15m/s (Not Recommended)
	Diagonal Motor-Motor Distance	350mm
Gimbal	Working Current	Static : 750mA; Dynamic : 900mA
	Control Accuracy	±0.03°
	Controllable Range	Pitch : -90° — 0°
	Maximum Angular Speed	Pitch : 90°/s
Camera	Operating Environment Temperature	0°C -40°C
	Sensor Size	1/2.3"
	Effective Pixels	14 Megapixels
	Resolution	4384×3288
	HD Recording	1080p30 & 720p
	Recording FOV	110° / 85°
Remote Control	Operating Frequency	5.728 GHz — 5.85 GHz
	Communication Distance (Open Area)	CE Compliance: 400m; FCC Compliance: 800m
	Receiver Sensitivity (1%PER)	-93dBm
	Transmitter Power	CE Compliance: 25mW; FCC Compliance: 100mW
	Working Voltage	120 mA@3.7V
	Built-In LiPo Battery Working Current/Capacity	3.7V, 2000mAh
Range Extender	Operating Frequency	2412-2462MHz
	Communication Distance (Open Area)	500-700m
	Transmitter Power	20dBm
	Power Consumption	2W
DJI VISION App	System Requirement Of Mobile Device	iOS version 6.1 or above/ Android system version 4.0 or above
	Mobile Device Support	• iOS recommended: iPhone 4s, iPhone 5, iPhone 5s, iPhone 6, iPhone 6 Plus, iPod touch 5 (available but not recommended: iPad 3, iPad 4, iPad mini) • Android recommended: Samsung Galaxy S3, S4, Note 2, Note 3 or phones of similar configuration

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Appendix C

Phantom 2 Vision+ Quick Start Guide

2 pages follow

(Source: http://www.dji.com/product/phantom-2-vision-plus/spec)

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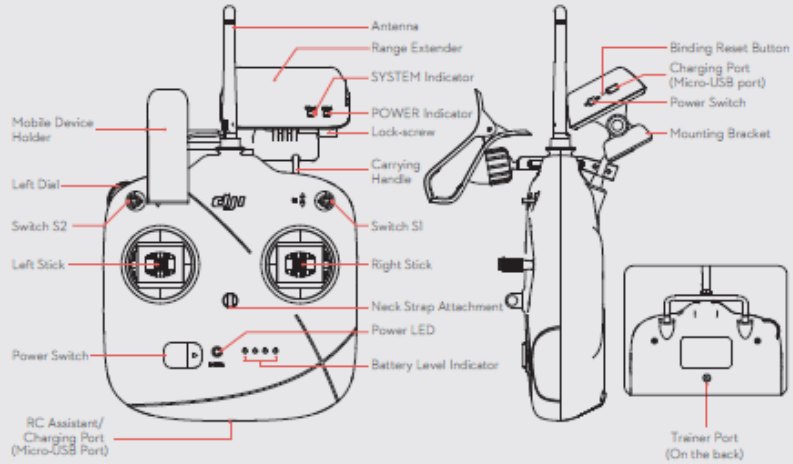
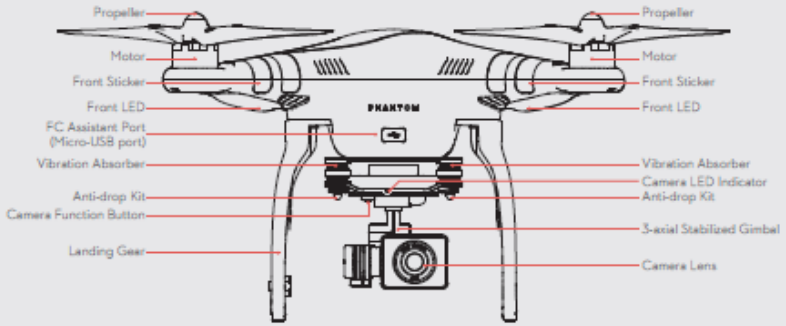
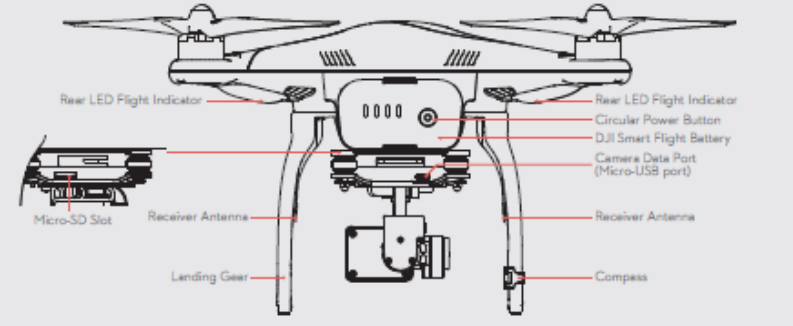
PHANTOM 2 VISION+

Quick Start Guide







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.**

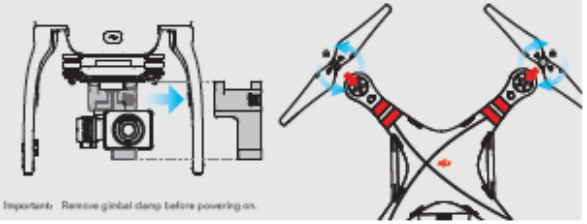
Important: For SAFETY reasons please watch tutorials, read the disclaimer and manuals thoroughly before using this product.

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

** See step 3 4 5 for checking battery levels. Refer to user manual for charging.

2 Preparing Phantom 2 Vision +

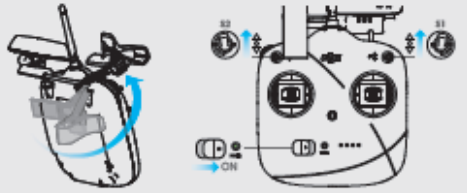
- Remove the gimbal clamp, the lens cap and the four warning cards from motors.
- Screw the propellers, clockwise for grey nuts and anti-clockwise for black nuts, onto the four motors. Be sure to match the black propeller nuts with the black dot motors.
- Make sure your Smart Flight Battery and Micro-SD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



Important: Remove gimbal clamp before powering on.

3 Preparing Remote Control

- Twist the Mobile Device Holder to fsce 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.

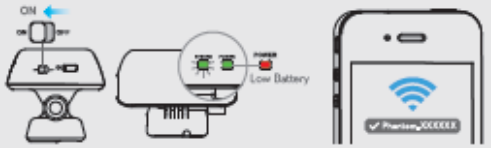
4 Powering On Smart Flight Battery

- 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

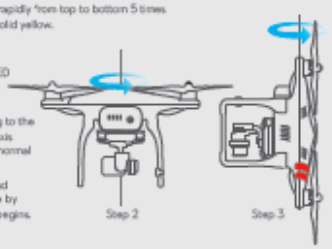
- Toggle power switch to ON position. SYSTEM indicator will blink green to show normal operation.
- Enable Wi-Fi on your mobile device then select Phantom XXXXXX from Wi-Fi network list.
- Tap CAMERA icon in the DJI VISION App for a live camera view to ensure the camera is linked, then clip your mobile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

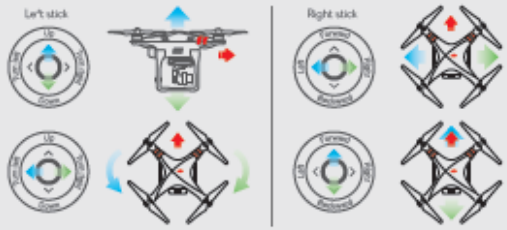
- Always calibrate compass before your flight.
- Step1 :
  To enter calibration mode, flip S1 switch rapidly from top to bottom 5 times or until Rear LED Flight Indicators turn solid yellow.
- Step 2:
  Hold Phantom horizontally then rotate 360°around the center axis until Rear LED Flight Indicators 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.
- 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

Nose pointing direction

- 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)

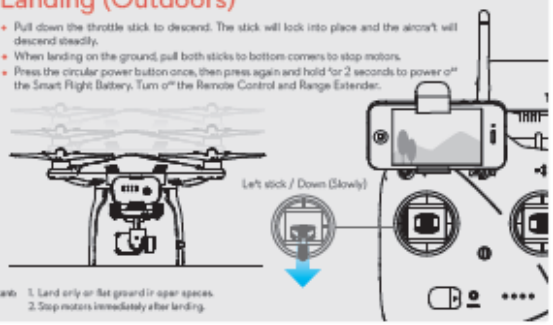
8 Taking off (Outdoors)

- 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.