U.S.Department
of Transportation

**Federal Aviation
Administration**

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

May 8, 2015

Exemption No. 11501
Regulatory Docket No. FAA–2015–0283

Mr. Bernard Malouin, Jr.
Right Angle Photography, LLC
85R Acton Road
Westford, MA 01886

Dear Mr. Malouin:

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 31, 2015, you petitioned the Federal Aviation Administration (FAA)
on behalf of Right Angle Photography, LLC (hereinafter petitioner or operator) for an
exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to
conduct aerial imaging, photography, and videography of properties.

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, Right Angle Photography, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Right Angle Photography 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 May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

31 January 2015

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

RE: Exemption Request, under Section 333 of the FAA Modernization and Reform Act, from 14 CFR Part 21;
14 CFR 61.113(a); 14 CFR 91.7(a); 14 CFR 91.9(b)(2); 14 CFR 91.105; 14 CFR 91.119(c); 14 CFR 91.121; 14
CFR 91.151(a)(1); 14 CFR 91.203(a)(1); 14 CFR 91.203(b); 14 CFR 91.405(a); 14 CFR 91.407(a)(1); 14 CFR
91.409(a)(1) & (a)(2); 14 CFR 91.417(a) & (b).

Dear Sir or Madam:

I, Bernard Malouin Jr, am writing pursuant to the FAA Modernization and Reform Act of 2012 and the
procedures contained within 14 CFR Part 11 to request that I, Bernard Malouin Jr, an owner and operator of
a small unmanned aircraft system, be exempted from certain Federal Aviation Regulations ("FARs") listed in
Table 1 in order to allow commercial operations of my small, unmanned aircraft system (sUAS) for aerial
imaging, photography, and videography of properties.

Section [1] of this petition includes my contact information as the applicant. Section [2] enumerates the
regulations from which exemption is being requested in order to permit the operation of a small,
lightweight sUAS under controlled conditions and in a predetermined and clearly bounded space for the
purpose of aerial imaging, photography, and videography of properties. These regulations that pertain to
the sUAS platform itself are further discussed in Section [3], along with additional measures to maintain the
current level of safety. Section [4] discusses exemptions pertaining to the operator, and how any potential
risks are mitigated by limiting operation to a trained, certificated pilot-in-command (PIC) with a visual
observer (VO). Section [5] examines exemptions pertaining to flight operations and how safety will be
maintained at an equivalent or higher level than current approaches by implementation of Standard
Operating Procedures (SOP). Finally, Sections [6] and [7] include a summary for the Federal Register and
concluding remarks, respectively.

With the platform, personnel, and procedures contained herein in place, as well any additional guidance
from the FAA in consideration of this exemption, it is my strong belief that these sUAS operations will meet
and exceed the current level of safety and environmental impact of larger scale manned aircraft that
currently perform these functions. Approval of this exemption would thereby enhance safety, reduce
environmental impact, and fulfill the responsibility of the Secretary of Transportation (the FAA
Administrator) to "…establish requirements for the safe operation of such aircraft systems in the national
airspace system" pursuant to Section 333(c) of the FAA Modernization and Reform Act of 2012.

[1]   APPLICANT CONTACT INFORMATION

The name, address, and additional contact information for the applicant is:

> Bernard Malouin Jr
> Right Angle Photography, LLC
> 85R Acton Road
> Westford, Massachusetts 01886
> Phone: (978) 467-4994
> Email: RightAnglePhotographyLLC@gmail.com

[2]   REQUEST FOR EXEMPTION FROM CERTAIN PARTS OF 14 CFR

The applicant hereby petitions the Secretary of Transportation and Federal Aviation Administration for exemption to the below referenced (in Table 1) and, in Sections [3] to [5] more fully described, Federal Aviation Regulations that currently may apply to the commercial use of a small, unmanned aircraft system.

Table 1 - List of Requested Exemptions

Regulation & Part		Description
14 CFR	Part 21	Design, production, and airworthiness approvals.
14 CFR	§ 61.113(a)	Private pilot privileges and limitations: Pilot in command.
14 CFR	§ 91.7(a)	Civil aircraft airworthiness.
14 CFR	§ 91.9(b)(2)	Civil aircraft flight manual, marking, and placard requirements.
14 CFR	§ 91.105	Flight crewmembers at stations.
14 CFR	§ 91.119(c)	Minimum safe altitudes: General.
14 CFR	§ 91.121	Altimeter settings.
14 CFR	§ 91.151(a)(1)	Fuel requirements for flight in VFR conditions.
14 CFR	§ 91.203(a)(1)	Civil aircraft: Certifications required.
14 CFR	§ 91.203(b)	Civil aircraft: Certifications required.
14 CFR	§ 91.405(a)	Maintenance required.
14 CFR	§ 91.407(a)(1)	Operation after maintenance, preventive maintenance, rebuilding, or alteration.
14 CFR	§ 91.409(a)(1)	Inspections.
14 CFR	§ 91.409(a)(2)	Inspections.
14 CFR	§ 91.417(a)	Maintenance records.
14 CFR	§ 91.417(b)	Maintenance records.

This exemption request is expressly submitted to fulfill Congress's goal in passing the FAA Modernization and Reform Act of 2012 (FMRA), Sections 333(a) through 333(c). This law directs the Secretary of Transportation to consider whether certain UAS may operate safely in the national airspace system before completion of the rulemaking called for under Section 332 of the same Act.

The Modernization and Reform Act of 2012 further states, if "the Secretary determines under [Section 333] that certain unmanned aircraft systems may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft systems in the national airspace system." The applicant interprets this provision to place the duty on the Secretary to not only process applications

for exemptions under Section 333, but for the Secretary to affirmatively craft conditions for the safe operation of sUAS, should it be decided that the conditions of this application do not fulfill the statutory requirements for approval.

Recently, the framework for precedent in this area has also been established with the granting of several exemptions on the grounds of Section 333, whereby safety to the national airspace system has been maintained. Some of these recent exemptions, which provide some obvious and apparent similarities to the current exemption request, are Exemption 11138 (Douglas Trudeau), Exemption 11062 (Astraeus Aerial), Exemption 11109 (Clayco, Inc), and Exemption 11110 (Trimble Navigation Ltd).

[3]　　RELATING TO THE SMALL, UNMANNED AIRCRAFT SYSTEM

[3.1]　　OVERVIEW AND SUPPORTING INFORMATION

The applicant petitions herein to exempt operations with a Phantom 2 Vision + (the sUAS). The Phantom 2 Vision + is a lightweight sUAS, carries no people or combustible fuel, and has several built-in safety features in the event of flight emergencies. Based on the physical and safety features of the Phantom 2 Vision +, along with previous findings in Exemption 11138 (Douglas Trudeau), it is believed that this platform falls under the purview of Section 333, is able to meet or exceed acceptable safety levels, and is appropriate for exemption.

Lightweight, small UAS. The complete specifications and operating limits for the Phantom 2 Vision + can be found in the Phantom 2 Vision + User Manual, supplied as an attachment to this petition. However, it is instructive to highlight some of the more pertinent operational limits that bound the risk of usage of the Phantom 2 Vision +:

- Maximum dimension of the Phantom 2 Vision + is less than 23 inches, which counts the maximum diagonal distance including maximum swept area of the propellers.
- Maximum weight for the Phantom 2 Vision + configurations flown under this petition are less than 3 lbs with imaging sensors onboard.
- Maximum speed for the Phantom 2 Vision + is 30 mph. In practice, the Phantom 2 Vision + is never flown at maximum speeds for the requested application (see Section [5.1]) as it is contrary to the objective of sharp photographs or smooth video. For reference, even at maximum speed, the momentum of the Phantom is comparable to a kicked soccer ball.
- Maximum flight time is limited to 30 minutes by available charge stored in the onboard battery.
- Exceptional agility is provided by yaw rates up to 200°/sec and 20 ft/sec climb rates. This agility allows the Phantom 2 Vision + to be safely operated in smaller, less accessible spaces than could ever be imagined with conventional aircraft. Also, avoiding obstacles or responding to flight emergencies can be accomplished with significantly less standoff distance than is currently required for larger, manned aircraft.

No occupants and benign cargo. A significant risk mitigation is provided by virtue of the fact that the sUAS is inherently unmanned. Any risk of injury to people onboard the aircraft is completely eliminated. This provides a significant safety upgrade over current operations that use manned helicopters to provide similar services. Low flying helicopters near tree lines not only endanger occupants of the helicopter, but also people on the ground. The sUAS avoids the risk to occupants completely. Additionally, as the Phantom 2 Vision + is an electric sUAS, the absence of a combustible fuel is an important factor in reducing risk to people and property on the ground should an accident occur.

Built-in safety features. The Phantom 2 Vision + has safety features to mitigate two of the most common malfunctions for sUAS – loss of communication with the base station and low battery levels.
- The Phantom 2 Vision + mitigates loss of communication (e.g., exceeding transmitter range, blocked RF signal, electrical malfunction) by incorporating GPS functionality. The Phantom 2 Vision + records the "home" GPS coordinates (set automatically on startup, verified during the preflight inspection). Then, if communication is lost during flight, the sUAS can hover in place to see if signal is restored or initiate a "Return to Home," returning to the "home" GPS coordinates and executing a landing there.
- If the battery reaches a critically low level, the "Return to Home" feature is also initiated. This feature returns the unit back to the "home" location and executes a landing before power is lost. This feature, and Standard Operating Procedures discussed in Section [5], mitigate one of the most tangible risks to sUAS – exhausting onboard battery charge that often leads to a crash.
- The sUAS also features a programmable maximum altitude and horizontal range to prevent accidental flight boundary excursions (limits set to 400 feet and 2000 feet, respectively).
- Finally, the sUAS includes software-defined "restricted areas" around airports where the Phantom 2 Vision + will not be able to operate. This is supplemented by Standard Operating Procedures which further reduce operating areas, as discussed later.

[3.2] REQUESTED EXEMPTION FROM 14 CFR Part 21 AND 14 CFR §91.203(a)(1)

Text of Cited Regulation:

(a) Except as provided in § 91.715, no person may operate a civil aircraft unless it has within it the following:

(1) An appropriate and current airworthiness certificate. Each U.S. airworthiness certificate used to comply with this subparagraph (except a special flight permit, a copy of the applicable operations specifications issued under § 21.197(c) of this chapter, appropriate sections of the air carrier manual required by parts 121 and 135 of this chapter containing that portion of the operations specifications issued under § 21.197(c), or an authorization under § 91.611) must have on it the registration number assigned to the aircraft under part 47 of this chapter. However, the airworthiness certificate need not have on it an assigned special identification number before 10 days after that number is first affixed to the aircraft. A revised airworthiness certificate having on it an assigned special identification number, that has been affixed to an aircraft, may only be obtained upon application to an FAA Flight Standards district office.

Reason for Exemption: 14 CFR Part 21, Subpart H, establishes the procedural requirements for the issuance of airworthiness certificates as required by 14 CFR §91.203(a)(1). Given the small size, modest maximum speed, and limited operating area associated with the sUAS to be used by the applicant, an exemption from Part 21 and §91.203(a)(1) meets the requirements of an equivalent level of safety under Section 333 of the FAA Modernization and Reform Act of 2012. The Federal Aviation Act (49 USC §44701(f)) and Section 333 of the FMRA both authorize the FAA to exempt aircraft from the requirement of an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight of the sUAS. In all cases, an analysis of these criteria demonstrates that the sUAS operated without an airworthiness certificate, in the limited environment and conditions proposed herein, will be at least as safe, or safer, than a conventional rotorcraft aircraft operating with an airworthiness certificate. The applicant respectfully requests confirmation that this sUAS does not require airworthiness certification, as allowed under Section 333 of the FMRA.

Mitigation Basis: Safety of the general public and the national airspace will be preserved by the safety features of the sUAS platform described in [3.1], the training and certification of the operator described in [4.1], and the additional operational limitations discussed in [5] and supplemented by the Standard Operating Procedures attached to this petition.

Previous clarification that, in relation to a similar sUAS, Part 21 Subpart H was not applicable, and therefore the sUAS does not require an airworthiness certification, was granted in Exemption 11138 (Trudeau).

[3.3]   REQUESTED EXEMPTION FROM 14 CFR §91.203(b)

Text of Cited Regulation:
> (b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under § 91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

Reason for Exemption: It is believed that, per the request for relief in [3.2] of this petition and recent rulings by the FAA (*cf.*, Exemptions 11138, 11062, and 11110), that an airworthiness certificate is not required for this sUAS. The cited portion of § 91.203(b) seemingly does not allow for aircraft that have been determined by the FAA to not need an airworthiness certificate. Thus, if this sUAS is decided not to need an airworthiness certificate (either under 14 CFR § 91.203(a)(1) or § 91.715), a waiver to 14 CFR §91.203(b) is being requested.

Mitigation Basis: Safety of the general public and the national airspace will be preserved by the safety features of the sUAS platform described in [3.1], the training and certification of the operator described in [4.1], and the additional operational limitations discussed in [5] and supplemented by the Standard Operating Procedures attached to this petition.

Previous clarification that, in relation to a similar sUAS, Part 21 Subpart H was not applicable, and therefore the sUAS does not require an Airworthiness certification, was granted in Exemption 11138 (Trudeau).

[3.4]   REQUESTED EXEMPTION FROM 14 CFR §91.7(a)

Text of Cited Regulation:
    (a) No person may operate a civil aircraft unless it is in an airworthy condition.

Reason for Exemption: This regulation requires that no person operate an aircraft unless it is in an airworthy condition. However, should [3.2] of this exemption be granted, there will be no airworthiness certificate issued to this aircraft. Therefore, no FAA regulatory standard will exist for determining airworthiness to fulfill this requirement. Therefore, relief from §91.7(a) is requested.

Mitigation Basis: An equivalent level of safety will be provided by the conflation of several factors. These factors include the low weight of the sUAS (*cf.*, [3.1]), the modest maximum speed of the sUAS (*cf.*, [3.1]), operation within the limits defined in [5.1] and the attached Standard Operation Procedures, and the successful completion of a pre-flight checklist before every flight. The pre-flight checklist has been crafted by the trained applicant specifically for this sUAS and has been iterated over the course of dozens of recreational flights. The pre-flight checklist can be found as an attachment to this petition and includes pre-flight checks of weather, battery levels, propeller structural integrity, other traffic in the area, and potential obstacles within the flight area (physical or electromagnetic).

The rigorous pre-flight inspection is to allow the PIC to determine, before every flight, whether the sUAS is in a condition safe for flight per §91.7(b). Relief from §91.7(b) is therefore not expected to be necessary, nor is it being requested as part of this petition.

Relief from §91.7(a) has previously been granted to similar petitions, for example Exemption 11138 (Douglas Trudeau) and Exemption 11110 (Trimble Navigation Ltd).

[3.5]   REQUESTED EXEMPTION FROM 14 CFR §91.9(b)(2)

Text of Cited Regulation:
    (b) No person may operate a U.S.-registered civil aircraft
        (1) For which an Airplane or Rotorcraft Flight Manual is required by § 21.5 of this chapter unless there is available in the aircraft a current, approved Airplane or Rotorcraft Flight Manual or the manual provided for in § 121.141(b); and
        (2) For which an Airplane or Rotorcraft Flight Manual is not required by § 21.5 of this chapter, unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

Reason for Exemption: As the sUAS will not be certificated under Part 21, a Flight Manual is not required by §21.5. Therefore, §91.9(b)(2) requires that there be available, in the aircraft, a "current approved Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof." This exemption is requested for three reasons. The first reason derives from the fact that there is no officially FAA-approved manual for this system, making the requirement inapplicable. Second, the inherent

small size of the platform makes stowage of such material impossible onboard the aircraft as required by §91.9(b)(2). Third, stowage of such a manual onboard the aircraft would not allow the PIC access to it during flight, causing a potential safety concern. Therefore, relief is requested for §91.9(b)(2).

Mitigation Basis: Safety of the general public and the national airspace will be preserved by best capturing the intent of the original regulation as it pertains to the sUAS at hand. The manufacturer's User Manual (attached) will be used in place of an approved Flight Manual. The manufacturer's User Manual captures pertinent information for safe flight and operation, including general performance data, proper takeoff/landing procedures, and procedures for emergency situations such as loss of a communications link. Stowage of this manual onboard the aircraft is both impossible and believed to be contrary to the intent of the regulation, as the PIC would not be able to access it during flight if it were onboard the aircraft. Therefore, the manufacturer's User Manual will be stored with the sUAS control station such that it is available to the PIC, consistent with the findings from FAA Memorandum "Interpretation regarding whether certain required documents may be kept at an UA's control station" dated 8 August 2014.

[3.6] REQUESTED EXEMPTION FROM 14 CFR §91.121

Text of Cited Regulation:
(a) Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating
> (1) Below 18,000 feet MSL, to
>> (i) The current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft;
>> (ii) If there is no station within the area prescribed in paragraph (a)(1)(i) of this section, the current reported altimeter setting of an appropriate available station; or
>> (iii) In the case of an aircraft not equipped with a radio, the elevation of the departure airport or an appropriate altimeter setting available before departure; or
> (2) At or above 18,000 feet MSL, to 29.92" Hg.
(b) The lowest usable flight level is determined by the atmospheric pressure in the area of operation as shown in the [*table omitted*]
(c) To convert minimum altitude prescribed under §§ 91.119 and 91.177 to the minimum flight level, the pilot shall take the flight level equivalent of the minimum altitude in feet and add the appropriate number of feet specified below, according to the current reported altimeter setting.

Reason for Exemption: This regulation requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set to the elevation of the departure airport or an appropriate altimeter setting available before departure. The sUAS may not have a barometric altimeter, but rather a GPS altitude readout from the flight system telemetry. Therefore, an exemption may be needed.

Mitigation Basis: An equivalent level of safety will be achieved by the operator by means of the Pre-flight checklist which records the altitude readout at the launch site as shown on the GPS altitude indicator before flight. This site altitude will be subtracted from subsequent GPS altitude readouts to arrive at

altitude AGL. This compensates for field-site barometric pressure variations when calculating altitude AGL. All altitudes reported to ATC will be in feet AGL.

Relief from §91.121 has previously been granted to similar petitions, for example Exemption 11062 (Astraeus Aerial) and Exemption 11138 (Douglas Trudeau).

[3.7] **REQUESTED EXEMPTION FROM 14 CFR §91.405(a), §91.407(a)(1), §91.409(a)(1) & (2), §91.417(a) & (b)**

Text of Cited Regulation:
(**.405**) Each owner or operator of an aircraft—
(a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;
*****
(**.407**) (a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—
(1) It has been approved for return to service by a person authorized under § 43.7 of this chapter
*****
(**.409**) (a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—
(1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by § 43.7 of this chapter; or
(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.
*****
(**.417**) (a) Except for work performed in accordance with §§ 91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:
(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—
(i) A description (or reference to data acceptable to the Administrator) of the work performed; and
(ii) The date of completion of the work performed; and
(iii) The signature, and certificate number of the person approving the aircraft for return to service.
(2) Records containing the following information:
(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by § 43.9(a) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

(**.417**) (b) The owner or operator shall retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under § 43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

Reason for Exemption: These sections reference the procedures and protocols under 14 CFR Part 43, which applies only to aircraft with an airworthiness certificate. Given that the sUAS will not have an airworthiness certificate, these sections will not apply to the applicant.

Mitigation Basis: Maintenance (including routine maintenance and repair to correct functionality issues) will be conducted by the operator. Any sUAS maintenance or alterations that affect operations or flight characteristics (e.g., replacement of a motor or electronic speed controller, but not replacement of the battery), will undergo a functional flight test before being returned to service. Such maintenance, inspection, or alterations will be noted in the aircraft logbook, to include total flight hours, description of work, and the signature of the person returning the sUAS to service. As required in §91.7(b), the PIC also completes a pre-flight checklist to ensure the sUAS is safe for flight before every flight. An equivalent level of safety is therefore achieved by documentation of any maintenance or repair work done on the sUAS, functional flight tests after certain maintenance, and pre-flight checkouts to ensure all systems are safe for flight.

Relief from §91.405(a), §91.407(a)(1), §91.409(a)(1) & (2), and §91.417(a) & (b) has previously been granted to similar petitions, for example Exemption 11062 (Astraeus Aerial), Exemption 11138 (Douglas Trudeau), and Exemption 11110 (Trimble Navigation Ltd).

[4] RELATING TO PILOT IN COMMAND

[4.1] OVERVIEW AND SUPPORTING INFORMATION

The applicant, Bernard Malouin Jr, would be the pilot-in-command (PIC) for all sUAS operations under this exemption request. Bernard Malouin Jr's commitment to safety, technical expertise in aerospace systems, flight training and certification, and experience with similar systems all enable operation of the sUAS while meeting or exceeding the safety levels currently seen in manned platforms that perform similar missions.

Technical Expertise. The PIC, Bernard Malouin Jr, is an engineer by training and experience. Bernard Malouin Jr received a Bachelor of Science degree in Aeronautical and Mechanical Engineering before receiving a Doctorate in Mechanical Engineering. In practice, Dr. Malouin has led the engineering development of several complex airborne systems. Furthermore, Dr. Malouin engages in teaching technical short courses on the topic of small quadcopters, systems akin to the sUAS referenced in this petition, as part of a Science, Technology, Engineering, and Math (STEM) enrichment program. Dr. Malouin has the technical background and knowledge to fundamentally understand the capabilities, and limitations, of the sUAS and to perform any required maintenance to keep the sUAS in safe, working order.

Flight Training and Certification. The PIC, Bernard Malouin Jr, currently holds an FAA-issued Private Pilot certification and a Third Class Medical certificate. Bernard Malouin Jr has held a Private Pilot certificate for over 10 years without incident. The applicant believes that the training provided, and proficiency demonstrated, in completing a Private Pilot certification program brings important, tangible skills useful to keeping the national airspace system safe while operating sUAS. The fundamental aeronautical knowledge from Private Pilot training is seen to have a direct correlation to maintaining safety, for example by better understanding general traffic patterns, airspace identification, weather identification, workload management, and the use of pragmatic safety processes.

Experience with Similar Systems. Skills specific to particular equipment operations (e.g., handling of controls, specific airspeeds, etc.) offer less of a parallel from traditional commercial aircraft to sUAS due to the great difference in responsiveness, control, and agility of these smaller systems. However, the PIC, Bernard Malouin Jr, has been flying small, electric RC helicopters and other small, unmanned aircraft systems recreationally for over 8 years. Bernard Malouin Jr has over 30 hours of flight time on small, electric rotorcraft in recreational settings. Moreover, Bernard Malouin Jr has over 10 hours of flight time on multi-rotor sUAS, and well over the 5 hours of logged flight time on the exact make and model of this exemption.

[4.2] REQUESTED EXEMPTION FROM 14 CFR 61.113(a)

Text of Cited Regulation:
> (a) Except as provided in paragraphs (b) through (h) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

Reason for Exemption: Regulation §61.113(a) limits operators with a private pilot certificate to non-commercial operations. While the sUAS will not be carrying passengers or transporting property for hire, the operator will be the pilot in command of an aircraft being used in a compensated activity. Therefore, an exemption from §61.113(a) is requested.

Mitigation Basis: Because the sUAS will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety of current operations by requiring the PIC operating the sUAS to have a private pilot certificate rather than a commercial pilot's license. Further, as explained in [4.1], the applicant is exceptionally well qualified to operate such systems, blending aeronautical knowledge from private pilot training, technical education in engineering, and years of recreational experience with like systems (which differ in operation and flight control from larger commercial aircraft). The combination of these relevant skills reduces the risk to the public and the national airspace to levels below what would be found with knowledge acquired from a commercial pilot license alone. To maintain a level of currency, within the previous 90 days the PIC will also conduct at least 3 take offs and landings with the sUAS before commencing a commercial flight as noted in the SOP. The size (*cf.*, [3.1]), speed (*cf.*, [3.1]), and operating limitations (*cf.*, [5] and SOP) found herein exceed the level of safety that would otherwise be found with a commercial pilot operating a conventional helicopter.

Relief from §61.113(a) has previously been granted to similar petitions, for example Exemption 11062 (Astraeus Aerial), Exemption 11138 (Douglas Trudeau), and Exemption 11110 (Trimble Navigation Ltd).

[5]   RELATING TO THE sUAS OPERATIONS

[5.1]   OVERVIEW AND SUPPORTING INFORMATION

The sUAS under this petition is equipped with an imaging sensor (e.g., GoPro video camera) and is to be operated for aerial imaging, photography, and videography of property in a limited and well-defined boundary. Some examples of aerial imaging include photographs or videos of structures (e.g., roofs, solar panels, etc.) for subsequent, post-flight visual inspection. Typical examples of aerial photography include the capture of photos of properties for post-flight use in marketing or advertising materials. Finally, some examples of aerial videography are short video clips (limited to 2 minutes in duration) of property for later composition and marketing, advertising, or other uses. All commercial operations are to take place on property with the permission of the property owner, owner's authorized representative, or cognizant local official.

The proposed operations serve many needs of homeowners, Realtors, and others in a way that is more cost effective and safer than traditional approaches. One example pertains to a homeowner or Realtor who wishes to have an aerial view of a property for advertising, marketing, or reasons of general interest. Traditional methods include the use of a helicopter, posing additional risks due to the persons onboard the platforms, significant weight (several tons), carriage of combustible Jet A fuel (over 100 gallons), and the relative lack of maneuverability/agility of such platforms. This is all compounded by additional harmful impacts to nearby persons who are then exposed to additional noise pollution in excess of 100 dB, causing non-active participant safety concerns. Conducting this operation with the sUAS greatly reduces (or in some cases, eliminates) these risks.

Safe operation of the sUAS will be ensured by a thorough set of Standard Operating Procedures. A separate document has been attached to this petition with the fully detailed SOP; however, these topically include:

- Operation limited to visual, line-of-sight (VLOS)
- Operation limited to daytime activities; no night operations
- Use of a visual observer (VO) for all flights, who is in direct verbal contact with PIC
- Operation limited to a maximum altitude of 400 feet AGL
- Operational minimum standoff distances for nonparticipating persons
- Operational minimum standoff distances for nonparticipating vehicles/structures
- Operation with minimum standoff distances to clouds
- No sUAS operations within 5 miles of a Class B, C, or D airport without ATC consent
- Comprehensive Pre-Flight inspection by the PIC to determine safe-for-flight
- Flight duration limited to 30 minutes in length or 30% battery remaining

Each of the above are listed in the attached SOP and are further elaborated upon in subsequent sections that discuss relief to specific FARs and how the portion of the SOP mitigates any risk that may be encountered by exemption from that particular FAR.

[5.2]   REQUESTED EXEMPTION FROM 14 CFR §91.105

Text of Cited Regulation:
(a) During takeoff and landing, and while en route, each required flight crewmember shall—
(1) Be at the crewmember station unless the absence is necessary to perform duties in connection with the operation of the aircraft or in connection with physiological needs; and
(2) Keep the safety belt fastened while at the crewmember station.
(b) Each required flight crewmember of a U.S.-registered civil aircraft shall, during takeoff and landing, keep his or her shoulder harness fastened while at his or her assigned duty station. This paragraph does not apply if—
(1) The seat at the crewmember's station is not equipped with a shoulder harness; or
(2) The crewmember would be unable to perform required duties with the shoulder harness fastened.

Reason for Exemption: The regulation requires crew members (which may include the PIC and VO) to keep a safety belt fastened while at their crewmember stations. As the sUAS has no occupants, this regulation is not applicable as it would be detrimental to flight safety to require the operator and visual observer *on the ground* to remain with a safety belt fastened. Therefore, exemption from §90.105 is requested.

Mitigation Basis: Due to the unusual nature of the sUAS operation (remotely from ground, with no onboard crew), the safety of the general public, pilot in command, visual observer, and national airspace system is *adversely* affected under the interpretation of this requirement that the pilot in command and the visual observer on the ground must have a safety belt fastened at a designated station.

[5.3]   REQUESTED EXEMPTION FROM 14 CFR §91.119(c)

Text of Cited Regulation:

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) *[omitted as not relevant to request for relief]*

(b) *[omitted as not relevant to request for relief]*

(c) *Over other than congested areas.* An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) *Helicopters.* Helicopters may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the Administrator.

Reason for Exemption: The regulation requires minimum standoff distances to persons and objects (in other than congested areas) of no less than 500 feet. Due to the altitude limitation of the sUAS (of 400 feet maximum) as well as the intended mission of aerial imaging/photography/videography, it will be necessary to operate closer than 500 feet to essential persons, structures, vehicles, and vessels. Therefore, an exemption is requested.

Mitigation Basis: The applicant has no intentions to operate the sUAS over congested areas. However, there is no clear definition as to what metrics constitute a congested area (as expressed in Exemption 11110). While "yellow" areas on sectional charts are a good means to alerting operators to potentially congested areas, these alone only indicate the general area is populated and is not sufficient to prescribe congestion (consistent with the findings of Exemption 11138), nor should they be used for such. The level of congestion should seemingly be determined relative to the aircraft being operated in the candidate Area of Operation. To ensure safety in the event of an emergency, the aircraft would ideally be afforded sufficient space to land without collision due to the density of nearby persons or structures. Clearly, the characteristic length scale (and, therefore, allowable density) for safe landing would vary substantially between an aircraft requiring hundreds of feet to make an emergency landing versus a sUAS that requires only several feet. The pilot in command will therefore use best judgment on whether a particular sUAS Area of Operation, which is spatially limited, is congested before commencing any flight activities. Such a judgment will take into consideration:

- The candidate Area of Operation will not be found acceptable if it includes an open air assembly of persons
- The candidate Area of Operation will be judged based on the expected flight boundaries. That is, a large open space in a heavily settled area would be judged based on the open space and not the surrounding area if operations are to be limited to safely within the open space.
- The candidate Area of Operation must provide sufficient free space away from persons and structures to allow typical takeoff, landing, and flight without presenting an undue hazard to nearby persons or structures.

- The candidate Area of Operation must provide sufficient free space to allow emergency landing procedures without presenting an undue hazard to nearby persons or structures.
- The candidate Area of Operation must allow the flight operations to adhere to the minimum standoff distances that would otherwise be required of an area other than a congested area.

If the Area of Operation is determined by the pilot in command to be congested, no flight operations shall occur. If the Area of Operation is determined by the pilot in command to be other than a congested area, the following limitations on flight operations will be imposed, based on the light weight of the sUAS (3 lbs) and the findings of previous FAA analyses:

- Minimum standoff distances to non-participating persons is nominally 500 feet.
- If barriers or structures are present that can sufficiently protect non-participating persons from the sUAS or debris in the event of an accident, then the sUAS may operate closer than 500 feet to non-participating persons afforded such protection.
    - If a situation arises where non-participating persons leave such protection and are within 500 feet of the sUAS, flight operations must cease as soon as is practicable and in a manner to ensure the safety of the non-participating person as the primary concern.
- Minimum standoff distances may be less than 500 feet to vessels, vehicles, and structures when the owner/controller of any such vessel, vehicle, or structure grants permission and the PIC makes a safety assessment of the risk of operating closer to those objects and determines that it does not present an undue hazard.
- Minimum distance to clouds will be 500 feet below any clouds and 2000 feet horizontally from any clouds to ensure the PIC and VO have VLOS with the sUAS throughout the flight.

It is noted that, currently, full-scale helicopters are permitted under §91.119(d) to operate in similar missions with potentially less restrictive requirements. It is believed that the proposed limitations will maintain the safety of the general public on the ground at levels that exceed current safety levels of conventional helicopters performing similar missions.

Relief from §91.119(c) has previously been granted to similar petitions, for example Exemption 11138 (Douglas Trudeau) and Exemption 11110 (Trimble Navigation Ltd).

[5.4]   REQUESTED EXEMPTION FROM 14 CFR §91.151(a)(1)

Text of Cited Regulation:

(a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed—

(1) During the day, to fly after that for at least 30 minutes

Reason for Exemption: The sUAS in this petition does not carry any fuel and, therefore, this regulation is not well-posed for this sUAS. The sUAS is battery powered with a total flight duration that is limited to approximately 30 minutes. Therefore, requiring enough battery power to fly to the first destination *plus* an additional 30 minutes is not feasible.

Mitigation Basis: The proposed operations of the sUAS are limited to a defined area, typically a single property, with the property owner/controller's consent. Due to this, it is believed that not being able to fly for an additional 30 minutes does not engender the types of risks that §91.151(a)(1) was intended to alleviate given the sUAS is small, relatively low speed, and will not be flown over non-participating structures. An equivalent level of safety can be achieved by limiting flights to 30 minutes or 30% remaining battery power (manufacturer-recommended low battery limit), whichever occurs first. This is more than adequate to return the sUAS to the intended landing area and execute a normal landing procedure.

Relief from §91.151(a)(1) has previously been granted to similar petitions, for example Exemption 11062 (Astraeus Aerial), Exemption 11138 (Douglas Trudeau), and Exemption 11110 (Trimble Navigation Ltd).

[5.5]   PROPOSED MODIFICATION OF TYPICAL SECTION 333 EXEMPTION CONDITION - NOTAMS

Text of Cited Typical Exemption Condition:
The operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under this grant of exemption. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation.

Feedback on Condition: Due to the nature of the assignments/missions, the starting day/time of the sUAS operations in this petition may not always be known three days in advance, and it would not be unexpected to be asked to support missions the next day (within 24 hours). Furthermore, weather conditions in the Northeast are variable with meteorological forecasts often changing when made several days in advance. It is therefore respectfully requested that the above typical exemption condition be modified to require the operator to request a NOTAM not more than 72 hours in advance, but <u>not less than 12 hours</u> prior to the operation.

Mitigation Basis: It is believed that this will not adversely affect national airspace safety as NOTAMs are checked before flights and may be checked during flights. Allowing NOTAMs to be requested closer to the actual flight operations (when weather conditions are more accurately predicted) will greatly increase the fidelity of the NOTAM process and airman awareness by producing fewer false-alarms, and, as a consequence, leading to greater vigilance to those receiving the NOTAM.

[6]   PUBLIC INTEREST

The proposed exemption under Section 333 of the FAA Modernization and Reform Act of 2012 is within the public interest. This petition for imaging, photography, and videography of property would allow access to aerial imaging to those who would previously have been excluded from the market by the cost of using a larger, manned aircraft. The impact to the public is multifaceted, including greater access to aerial capabilities, increased levels of safety over conventional manned systems to perform the same duty, and reduced impact to nearby persons or ecological sites due to noise or burned hydrocarbon emissions.

One example is a homeowner who suspects possible roof damage, perhaps as a result of a recent storm. To determine if damage has occurred, the homeowner may wish to inspect the roof before calling a carpenter or repairperson. This may lead to an unprepared homeowner in peril on an icy or slippery roof. By comparison, the sUAS can quickly be used to image the suspect area and those images can subsequently be visually inspected by the homeowner, greatly reducing the risk to persons.

A second example pertains to a homeowner or Realtor who wishes to have an aerial view of a property for advertising, marketing, or reasons of general interest. Traditional methods include the use of a helicopter, posing additional risks due to the persons onboard the platforms, significant weight (several tons), carriage of combustible Jet A fuel (over 100 gallons), and the relative lack of maneuverability/agility of such platforms. This is all compounded by additional harmful impacts to nearby persons who are then exposed to additional noise pollution. Typical decibel noise level for a Bell helicopter at 100 feet is approximately 100 dB. By contrast, the sUAS at less than 10 feet is approximately 80 dB, leading to a 4X reduction in noise pollution, even when 10X closer.

[7]   SUMMARY FOR PUBLICATION IN THE FEDERAL REGISTER, IF NEEDED

Pursuant to 14 CFR Part 11, the following summary is provided for publication in the Federal Register, should it be determined that publication is needed:

Applicant seeks an exemption from the following rules:

14 CFR Part 21, Subpart H; 14 CFR §61.113(a); 14 CFR §91.7(a); 14 CFR §91.9(b)(2); 14 CFR §91.105; 14 CFR §91.119(c); 14 CFR §91.121; 14 CFR §91.151(a)(1); 14 CFR §91.203(a)(1); 14 CFR §91.203(b); 14 CFR §91.405(a); 14 CFR §91.407(a)(1); 14 CFR §91.409(a)(1); 14 CFR §91.409(a)(2); 14 CFR §91.417(a); 14 CFR §91.417(b) to operate a small, unmanned aircraft system (sUAS) weighing less than 3 lbs in commercial aerial imaging, photography, and videography operations.

[8]   CONCLUDING REMARKS

It is believed that the criteria presented in this petition, including size, weight, operational parameters, pilot qualifications and training, and Standard Operating Procedures, provide a very high level of safety, at or above current levels, during the proposed sUAS use. This level of safety, the interest to the public, and the

commission of the FAA to integrate sUAS into the national airspace provide more than adequate justification for the grant of the requested exemptions allowing commercial operation of the applicant's sUAS.

The attached Standard Operating Procedures, Pre-Flight Checklist, and Emergency Procedures have been developed by efforts of Right Angle Photography, LLC. However, this material is permitted to be shared and posted without specific protections to facilitate safe and thoughtful flight operations across the community.

The applicant is very passionate and active in the field of sUAS. Should any supplemental information be helpful in the adjudication of this exemption petition, please do not hesitate to get in contact. Moreover, if it provides any value now or in the future, the applicant would be pleased to offer feedback on the exemption process or offer input (either procedural or technical) on future implementations to satisfy Sections 332 or 334 of the FMRA. The applicant is actively engaged in teaching short courses to high school students on the topic of sUAS and would be a willing advocate on awareness of proper protocols in integrating sUAS into the national airspace as this field continues to emerge.

Respectfully submitted,

Bernard Malouin Jr, Ph.D.
Right Angle Photography, LLC
85R Acton Road
Westford, Massachusetts 01886

ENC: Right Angle Photography sUAS Standard Operating Procedures
        Right Angle Photography sUAS Pre-Flight Checklist
        Right Angle Photography Emergency Procedures
        DJI Phantom 2 Vision + User Manual

Standard Operating Procedures

All commercial flights of the sUAS will be in accordance with these Standard Operating Procedures established by Right Angle Photography, LLC. These Standard Operating Procedures are broken down into sections relating to the sUAS platform and inspections, the pilot in command, flight environments, operational limits, and maintenance.

The sUAS Platform and Inspections

- The sUAS platform shall be the DJI Phantom 2 Vision +, weighing less than 3 lbs
- The Phantom 2 Vision + platform and controller shall comply with FCC regulations
- The sUAS software and firmware shall be regularly updated with manufacturer's current versions
- The PIC shall perform a pre-flight inspection to ensure the sUAS is safe for flight
- The pre-flight checklist shall include at least the following:
    - Check of weather conditions and predictions
    - Check of aircraft (manned or unmanned) traffic in the area
    - Check of the area for potential obstacles (e.g., power lines, trees, birds, sun glare)
    - Check of battery levels and condition
    - Check of propellers and ground controller
- Any conditions that affect the safe operations of the sUAS shall be corrected before it returns to flight
- Only fully charged batteries shall be used for the start of the sUAS flight
- The pilot in command (PIC) or visual observer (VO) shall record the field altitude, in feet, before flight
- The sUAS User Manual shall be available to the PIC during flight
- The sUAS shall be appropriately stowed in a case, vehicle, or structure when not in use
- When not expected to be in operation in the near future (i.e., not on the way to, preparing for, or on the way back from a flight), the sUAS shall be stored with the battery removed

The Pilot in Command

- The PIC shall have a private pilot certificate and third class medical
- The PIC shall have a Visual Observer (VO) for any sUAS flight operations
- The PIC shall be identified before flight, and shall identify the VO and any other essential personnel
- The PIC shall be able to communicate verbally with the VO at all times during flight operations
- The PIC shall ensure that the VO is suitably trained to perform his/her necessary functions
- The PIC shall review an aeronautical chart or vfrmap.com to be familiar with area/airspaces
- The PIC shall have 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, and 5 hours in the particular make and model
- The PIC shall have performed at least 3 takeoffs and landings with the sUAS within the past 90 days
- The PIC shall not operate the sUAS from any moving vehicle or device
- The PIC shall identify possible locations for an emergency landing before the flight

Flight Environments
- The sUAS shall not be flown at night
- The sUAS shall not be flown in precipitation
- The sUAS shall not be flown when steady winds exceed 20 mph or gusts exceed 25 mph
- The sUAS shall not be flown when ambient temperature is less than 20°F, or greater than 95°F
- The sUAS shall not be flown when visibility is less than 3 statute miles from the PIC
- The sUAS shall not be flown at altitudes higher than 400 feet AGL
- The sUAS shall not be flown farther than 2,000 feet horizontally from the PIC
- The sUAS shall not be operated less than 500 feet below or less than 2,000 feet horizontally from clouds
- The sUAS shall not operate within 5 miles of a Class B, C, or D airport without prior consent from ATC
- The sUAS shall not be operated over congested or densely populated areas
- The sUAS shall only be operated over private or controlled-access property with permission from the land owner, owner's authorized representative, or local official
- A fire extinguisher shall be available to the PIC in the event of an emergency

Operational Limits
- The PIC shall announce "CLEAR" before starting the propellers on the sUAS
- The sUAS shall only be flown within Visual Line-of-Sight (VLOS) of the PIC and the VO
- The sUAS shall not be operated at an indicated airspeed in excess of 30 mph
- Any single sUAS flight shall not exceed 30 minutes in duration
- Any single sUAS flight shall not exceed the point where the battery reaches 30% capacity remaining
- Minimum standoff distances to non-participating persons shall be no less than 500 feet unless protective barriers or structures are present to protect from the sUAS or debris
- Minimum standoff distances to non-participating vessels, vehicles, or structures shall be no less than 500 feet unless the owner/controller grants permission and the PIC determines closer operation does not present an undue risk
- The sUAS flight shall be aborted in the event of a flight emergency or malfunction that may affect flight
- The sUAS shall remain clear of, and yield the right of way to, all manned aviation operations

Maintenance
- Maintenace on the sUAS shall be performed by the manufacturer or Bernard Malouin Jr
- Maintenance shall be recorded in the sUAS logbook, to include date, total flight hours, work that was completed, and a signature of the person who completed or inspected the work
- Maintenance or repair that affects the sUAS operation or flight characteristics shall undergo a functional test flight before being returned to service. The PIC of that test flight shall sign the logbook confirming successful flight test.

Pre-Flight Inspection Checklist

AREA CHECKS

☐ Record Date and Time: S M Tu W Th F S _____, 20_____ at _____ AM/PM

☐ Check weather conditions (visually or via radar) to confirm that no adverse weather conditions are expected

☐ Record current weather conditions to best estimate:

      Rain in Area? YES or NO

      Current Temperature = _____ F   *(must be between 20°F and 95°F)*

      Current Wind Conditions = _____ mph   *(must not exceed 20 mph)*

      Current Wind Gusts = _____ mph   *(must not exceed 25 mph)*

      Current Visibility = _____ miles   *(must be 3 miles or greater)*

☐ Confirm that no other sUAS are flying in vicinity that may yield signal interference

☐ Record class of airspace from sectional chart or vfrmap.com: Class_____ *(no operations in Class B, C, or D w/out prior ATC consent)*

☐ Note the proximity of nearest airport from sectional chart or vfrmap.com: _____ miles

☐ Visually survey the flight area, note any obstructions that could be hazardous during flight:

    ○ Trees   ○ Low Clouds   ○ Cell Towers

    ○ Power Lines   ○ Flags / Light Posts   ○ High Voltage Lines

    ○ Birds   ○ Sun Glare   ○ Wind Turbines

    ○ Other:

☐ PIC evaluation of whether candidate Area of Operation constitutes a congested area, a densely populated area, or an area over an open air assembly of persons: YES   or   NO   *(operations cease if "yes")*

☐ Identification of alternate or emergency landing spots:

sUAS CHECKS

☐ Ensure Photocopter is placed on a flat area for takeoff, with battery facing toward PIC

☐ Battery has been inspected for signs of damage or leakage and considered satisfactory for flight

☐ Check Photocopter battery level – do not use if less than 4 bars (88% charge). Number of bars = _____

☐ Verify that the flight battery is fully installed

☐ Place phone or tablet in Remote Control clamp or final location for flight

☐ Ensure transmit antenna is oriented toward the sky and not obstructed by phone, range extender, or other objects

☐ Remove gimbal clamp and lens cap from Photocopter

☐ Inspect the vibration dampers for cracks or splits

☐ Verify that the micro SD card has been properly installed into memory slot

☐ Inspect all four propellers to look for signs of damage (cracks, chips, etc.) that would jeopardize flight

☐ Visually check that the receiver antenna and compass are intact and not unusually loose

POWERING UP

☐ Ensure S1 and S2 switches are all the way up on the Remote Control

☐ Power on the Remote Control, after two beeps lights should be green to indicate transmitting with full power

☐ Turn on the Range Extender; green light indicates full power, do not use if yellow

☐ Power up the Photocopter

☐ While waiting on startup, scan the sky or check FlightRadar app for excessive or low flying aircraft in area

☐ Check gimbal for proper operation: Rotate Photocopter and ensure gimbal remains steady

☐ Check camera LED indicator – must be green (solid or blinking)

CALIBRATIONS

- ☐ Ensure that Photocopter is placed on level ground away from metal objects or power lines
- ☐ Quickly switch S1 from up-most position to down-most position and back to up-most position a total of 5-7 times. This enters into compass calibration mode. LED flight indicator light should turn solid yellow to indicate ready for calibration.
- ☐ Rotate Photocopter around the gravity vector 360 degrees for horizontal calibration. LED flight indicator light should then turn solid green to indicate ready for start of vertical calibration.
- ☐ Keeping the nose pointed along the gravity vector, rotate the Photocopter 360 degrees around the gravity vector. The nose should remain pointed downward during this entire process.
- ☐ LED flight indicator light should return to normal operation to indicate successful calibration

CONNECTING AND TELEMETRY

- ☐ On the iPhone or tablet, select Phantom_XXXX from the wifi network list to connect the diagnostic/video link
- ☐ Run the DJI Vision application on the iPhone and confirm a good link has been established (green indicator)
- ☐ Verify:

    Wifi signal intensity = _____ (≥ 3 bars)   Flight battery level =_____ (≥ 85%)

    GPS satellite locks = _____   Range extender battery = _____ (≥ 50%)

    Remaining Micro-SD images = _____   Remaining iPhone battery = _____(≥ 40%)

- ☐ Confirm altitude and flight info look correct on telemetry stream. Note starting altitude = _____ feet

STARTING MOTORS

- ☐ Announce "CLEAR!" and make sure no one is within 5 ft of Photocopter before it is powered up
- ☐ Both sticks to lower inside corner to start the motors for flight
- ☐ Confirm all 4 props are spinning smoothly and at approximately the same rotational speed
- ☐ Is Photocopter deemed safe for flight by the PIC?   YES   or   NO   *(operations cease if "no")*
- ☐ Record color of flashing lights: Green (w/GPS) or   Yellow (no GPS yet)
- ☐ If lights are flashing yellow (no GPS yet) then slowly bring Photocopter to tree height and hover to wait for GPS-lock (lights turning green). If lights do not turn green, then return home. Did lights turn green at tree height?   YES   or   NO
- ☐ GPS position set. If lights are flashing green then GPS home position can be set by quickly flipping S2 from top to bottom and back to top and repeating for a total of 5-7 times. Rear LED indicators will blink green rapidly when successful.

    ○   GPS Position set on startup   ○   GPS Position set here   ○   No GPS Position and aborted

END OF FLIGHT

- ☐ Land Photocopter and bring both sticks to lower inside corner to stop motors immediately after touchdown
- ☐ Turn off power to the Photocopter
- ☐ Place gimbal clamp back onto camera, and lens cover on camera lens
- ☐ Turn off power to remote control and range extender
- ☐ Record time that motors were turned off on copter: _____
- ☐ Record maximum height during flight: _____ feet
- ☐ Secure the Photocopter in a case, vehicle, or structure

PILOT IN COMMAND: _____   VISUAL OBSERVER: _____

EMERGENCY PROCEDURES

These procedures are to provide quick-reference guidelines in the event of an in-flight emergency during sUAS operations. The PIC and VO should become familiar with these procedures before flight operations begin. These guidelines provide suggestions only. In an actual flight emergency, the PIC should determine the best course of action with the highest priority being the safety of other aircraft and persons on the ground, followed by the safety of vehicles, vessels, and structures on the ground.

To minimize likelihood of flight emergencies:

- Standard Operating Procedures should be followed at all times
- A Pre-flight checklist should be completed before every flight
- The PIC should survey the proposed flight area, note obstacles, and identify possible landing areas
- The PIC should refrain from conversation or dialogue that may distract him/her from flight operations

In the event of an emergency, immediately land the sUAS at the nearest ground location that does not create additional undue hazard.

Suggested actions for various Flight Emergencies:
- **Wind Gusts into Trees:** Increase altitude to clear the trees (remain < 400 AGL), then maneuver away from obstacles and land the sUAS in an open area if wind gusts make control of the sUAS difficult.
- **Loss of Communications Link:** The sUAS will hover in place and automatically initiate the Return to Home sequence to return to original takeoff location.
    - Once back in range, the Return to Home sequence can be interrupted to regain control by flipping S1 from Position 1 to Position 3
- **Loss of VLOS to sUAS:** Release control sticks to hover in place if VLOS is maintained by VO or can be re-established quickly. If VLOS is not expected to be re-established quickly, turn the Remote Controller off to initiate the automatic Return to Home sequence on the sUAS.
- **Critically Low Battery:** The sUAS will initiate the Return to Home sequence automatically and return to the home position and descend.
    - The throttle stick will remain active during this phase to allow descent control or to avoid new obstacles that were not previously present
- **Sudden Low Ceiling or Precipitation:** Land the sUAS at the nearest ground location that doesn't present undue hazard
- **Battery Fire:** Stand back from flames. Allow the battery to burn out, battery will only burn for a few minutes and then go out. Use a fire extinguisher to extinguish any fire that spreads to nearby terrain, vegetation, or structure.

PHANTOM 2 VISION+

User Manual

Phantom 2 Vision+ User Manual V1.1.1

April 04, 2014

Congratulations on purchasing your new DJI product. Please read this manual carefully before using this product.

We recommend checking the Phantom 2 Vision+ page at **www.dji.com** for news and updates on everything from product specs to manual updates. Due to ongoing development, information contained in this manual may change without notice.

If you have any questions or concerns about your product, please contact your DJI authorized dealer or DJI Customer Service.

Using this manual

Key

⊘	Warning
⚠	Important
💡	Hints and Tips
🔍	References or Definitions

Important

Except when specifically stated, all descriptions in this manual are for Phantom mode, not Naza-M mode.

Before Flight

The following tutorials and manuals have been produced to ensure you to make full use of your Phantom 2 Vision+.

(1)   *Disclaimer*

(2)   *Phantom 2 Vision+ Quick Start Guide*

(3)   *Phantom 2 Vision+ User Manual*

(4)   *Phantom Pilot Training Guide*

Watching all the tutorial videos and reading the Disclaimer before flight is recommended. Afterwards, prepare your first flight using the Phantom 2 Vision+ Quick Start Guide. Improve your flying skills in subsequent flights using the Phantom Pilot Training Guide. Refer to this manual for more comprehensive information. Experienced users, particularly those with DJI Phantom 2 Vision experience should skip to the Phantom 2 Vision+ Quick Start Guide to begin preparing for flight.

Tutorials

Watch the quick start tutorial videos below to ensure a safe first flight.

Web link.	http://www.dji.com/phantom2visionplus/training	
QR code.	[QR code]	Preparing for flight.

Downloading the DJI VISION App

Download and install the DJI VISION App before use. Choose from one of the download methods below.

Download from the App Store or Google Play.	iOS	Search "DJI VISION" on the App Store then follow instructions.
	Android	Search "DJI VISION" on Google Play then follow instructions.
Scan QR code.	[QR code]	Scan QR code then follow instructions.

Contents

Overview

The Phantom 2 Vision+ is the next evolution of the Phantom 2 Vision. It features the same App enabled First Person View (FPV), high performance camera, remote camera control and in-flight content sharing, but adds to it a high performance 3- axial camera stabilization system. It is ideal for aerial creativity whether photo or video.
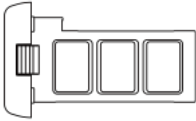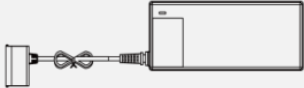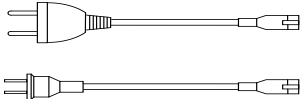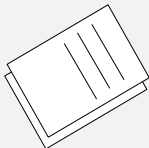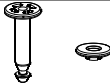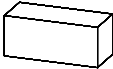
🔍 **FPV:** First Person View, see the world from the perspective of the craft and feel a true flying experience.

1 In the Box

Check that all of the following items have been included in your package before use. If anything is missing, please contact your local dealer.

NO.	Name	Picture	Qty.	Remarks
1	Aircraft		1	Integrated gimbal and camera
2	Propeller Pairs		4	4 with black nut, 4 with grey
3	Micro-SD Card	4GB Micro-SD	1	Inserted in aircraft Micro-SD slot
4	Lens Cap		1	Fixed to camera lens
5	Gimbal Clamp		1	Attached to the gimbal
6	Propeller Detaching Wrench		1	In maintenance packet
7	Remote Controller		1	Includes attached Phone Holder and Range Extender
8	AA Batteries		4	For Remote Controller

9	DJI Smart Flight Battery		1	Inside aircraft
10	Charger		1	110-240V Adaptive
11	Power Cables		1	GB & CE
12	Plug Set		1	SAA & BS
13	Micro-USB Cable		1	For Wi-Fi extender charging and firmware upgrade
14	Manuals		4	*Including: Disclaimer, Phantom Pilot Training Guide, Phantom 2 Vision+ Quick Start Guide, User Manual*
15	Stickers		1	2 Colors: Pink, Blue
16	Spare Dampers		4	In maintenance packet
17	Anti-drop Kit		2	In maintenance packet
18	Spare Screws		11	In maintenance packet M3X5(6pcs); M3X8(5pcs)
19	Damper Packet		4	In maintenance packet

2 Introduction

The Phantom 2 Vision+ package includes: Phantom, Camera, Gimbal, Propulsion System, Flight Control System, Remote Controller and Wi-Fi Communication System. 5.8 GHz Remote Control Receiver, Flight Control System and 2.4 GHz Wi-Fi Module are inside the Phantom.

Remote Controller
•5.8GHz
•2 sticks, 7channels

Mobile Device, with DJI VISION App

Phone Holder

Range Extender

Remote Controller

Motor

Aircraft

Gimbal

Propeller

Camera

Outside
•3-axial Stabilized Gimbal
•Camera
•Motors and Props

Inside
•Flight Control System
•2.4GHz Wi-Fi Module
•5.8GHz Receiver
•Electronic Speed Controls (ESCs)

Working Modes
•Phantom - Ready to Fly and Ready to Fly (non-GPS)
•Naza-M - GPS, ATTI., Manual and Failsafe

Figure 1

Choose between Phantom and Naza-M working modes using Phantom 2 Vision+ Assistant Software. If using Naza-M mode, please refer to the <u>NAZA-M V2 Quick Start Manual</u> for related instructions.

Phantom: Flight settings will be elected automatically depending on whether 6 or more satellites have been found. This mode allows users to configure the Remote Controller and gain values, and use Failsafe and battery level warnings.

Naza-M: Flight settings will be identical to the Naza-M V2. Users can choose between GPS, Attitude, or Manual mode. They can also access advanced settings including Intelligent Orientation Control (IOC). Rear LED Flight Indicators will display the flight status according to the Naza-M indicator.

Ready to Fly: When 6 or more GPS satellites have been found, the Flight Control System will lock its home point and Rear LED Flight Indicators will blink a slow green (● ● ● ● ●). This mode is ideal for beginners.

Ready to Fly (non-GPS): When less than 6 GPS satellites have been found, the Flight Control System will stabilize itself less than in full Ready to Fly mode and will require more skilled flying. Rear LED Flight Indicators will blink a slow yellow (● ● ● ● ●).

Assembly and Use

Follow the below instructions to prepare for flight.

1 Removing Gimbal Clamp

Pull gimbal clamp in the direction indicated to remove.
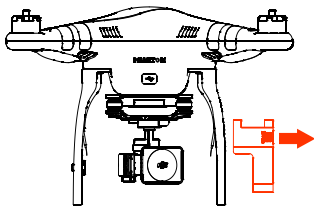
Figure 2

🚫	To avoid damage to the gimbal, remove Gimbal Clamp before powering up the Phantom.
💡	Attach the Gimbal Clamp during transportation or long term storage to avoid damage

2 Preparing the Battery

Ensure all related devices are fully charged before flying the Phantom 2 Vision+.

Device	Power supply
Remote Controller	4 AA batteries.
Range Extender	Charge fully through Micro-USB port. See Charging the Range Extender (Page 30) for details.
Aircraft (including gimbal and camera)	DJI Smart Flight Battery.
Mobile Device	Charge fully before using the DJI VISION App.

2.1 DJI Smart Flight Battery

This battery has been specially designed for the Phantom 2 series. It has a battery capacity of 5200mAh, voltage of 11.1V and charge-discharge management functionality. It can only be charged with a DJI charger or Phantom 2 Car Charger.
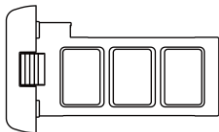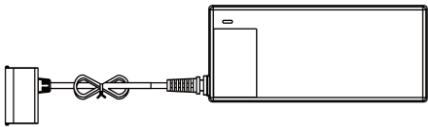
Smart Flight Battery   Charger

Figure 3   **Figure 4**

DJI Smart Flight Battery Functions	
(1) Balance Charging	Automatically balances the voltage of each battery cell during charging.

(2)	Capacity Display	Displays current battery levels.
(3)	Communication	Communicates with main controller about battery voltage, capacity, current and other relevant information.
(4)	Overcharge Protection	Charging stops automatically when battery voltage reaches 12.8V to prevent overcharge damage.
(5)	Over Discharge Protection	Discharging stops automatically when battery voltage reaches 8.4V to prevent over discharge damage.
(6)	Short Circuit Protection	Automatically cuts power supply when a short circuit is detected.
(7)	Sleep Protection	Sleep mode is entered after 10 minutes of inactivity to save power.
(8)	Charging Temperature Detection	The battery will charge only when the temperature is between 0℃ (32°F) and 40℃ (104°F).

Battery Specifications	
Type	LiPo
Capacity	11.1V, 5200mAh
Charging Environment Temperature	0°C~40°C
Discharging Environment Temperature	-20°C~50°C
Charging/Discharging Environment Relative Humidity	< 80%

⚠ Please read the user manual, disclaimer, and battery warnings before use. Users take full responsibility for all operations and usage.

2.2 Usages

LED2
LED1
Battery Level Indicators
LED3
LED4
Circular Power Button
(Built-in Power Light)
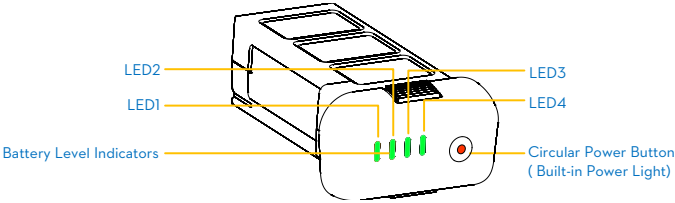
Figure 5

Powering on/off

Powering on: Press Circular Power Button once, then press again and hold for 2 seconds to power on. Power Light will go red and Battery Level Indicators will show the current battery level.

Powering off: Press Circular Power Button once, then press again and hold for 2 seconds to turn off. Battery Level Indicators will all go out.

Checking the battery level

When the battery is powered off, press the Circular Power Button once. Battery Level Indicators will light up to

show battery level. See below for details.

Battery Level Indicators will show the current battery level during charging and discharging. The indicators are defined below.

■ : LED is on   ● : LED blinks   ■ : LED is off

Discharging process				
LED1	LED2	LED3	LED4	Current battery level
on	on	on	on	87.5%~100%
on	on	on	blink	75%~87.5%
on	on	on	off	62.5%~75%
on	on	blink	off	50%~62.5%
on	on	off	off	37.5%~50%
on	blink	off	off	25%~37.5%
on	off	off	off	12.5%~25%
blink	off	off	off	0%~12.5%
off	off	off	off	<0%

Battery life

When the battery is powered off, press and hold the Circular Power Button for 5 seconds to check battery life. Battery Level Indicators will show light up and the Battery Power Indicators will blink for 10 seconds. All lights will then turn off. For details, please see below.

Battery life				
LED1	LED2	LED3	LED4	Current battery life
on	on	on	on	90%~100%
on	on	on	blink	80%~90%
on	on	on	off	70%~80%
on	on	blink	off	60%~70%
on	on	off	off	50%~60%
on	blink	off	off	40%~50%
on	off	off	off	30%~40%
blink	off	off	off	20%~30%
off	off	off	off	Less than 20%

⚠ When batter life reaches 0, it is no longer operational.

More battery information is available in the battery tab of the Phantom 2 Vision+ Assistant.

2.3 Charging the Flight Battery

1. Connect charger to wall socket (100-240V, 50/60Hz, using the plug set if necessary).
2. Connect battery to charger. If the current capacity of the battery is over 75%, you should turn it on before beginning to charge.
3. Battery Level Indicators will display current capacity level as the battery charges.
4. Battery is fully charged when Battery Level indicator lights are off. Disconnect the charger and battery when charging is complete.

Socket
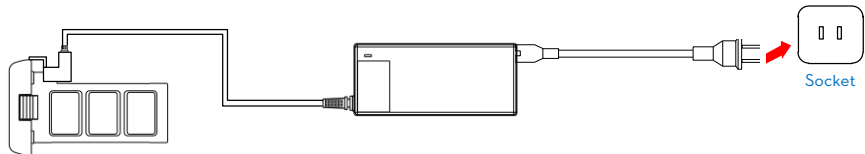
Figure 6

Charging process				
LED1	LED2	LED3	LED4	Current battery level
🟢	⬛	⬛	⬛	0%~25%
🟢	🟢	⬛	⬛	25%~50%
🟢	🟢	🟢	⬛	50%~75%
🟢	🟢	🟢	🟢	75%~100%
⬛	⬛	⬛	⬛	Fully charged

The Smart Flight Battery can be charged using an optional Phantom 2 Car Charger. This can charge the battery in-car or through 3S-6S Li-Po batteries. Contact your authorized dealer or DJI customer service for details.

(1) Battery should only be charged with the charger provided by DJI. DJI does not take any responsibility for damage caused by third party chargers.

(2) If current battery level is over 75%, the battery should be turned on before charging.

2.4 Battery Installation

Push battery into battery compartment according to the below diagram. When you hear a click, the battery has been properly installed.
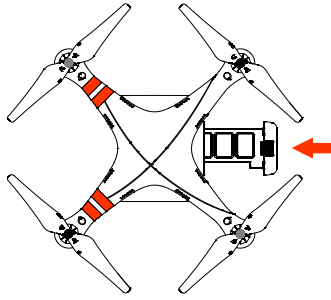
Figure 7

⚠️ An incorrectly installed battery may cause (1) Bad contact, (2) unavailable battery information, (3) unsafe flight, (4) inability to take off.

2.5 Correct Battery Usage Notes

1. When the battery is turned on, do not connect it to or disconnect it from the Phantom.

2. Charge and discharge the battery completely once every 20 charge/discharge cycles. Discharge the battery until there is less than 8% power or until it can no longer be turned on, then recharge it to maximum capacity. This power cycling procedure will optimize the battery.

3. For long term storage, place the battery with only a 40~50% charge in a strong battery box. Discharge and charge the battery once every 3 months to keep it in good condition. Charge amount should be varied in these maintenance charges - (40%~50%)—0%—100%—(40%~50%).

4. Purchase a new battery after your current battery has been discharged over 300 times. Completely discharge a battery prior to disposal. Please dispose of batteries properly.

5. Purchase a new battery if your current battery swells up or is damaged in any way.

6. Never recharge or fly with a battery that is swollen or damaged in any way.

7. Never charge batteries unattended. Always charge batteries on a non-flammable surface such as concrete and never near any flammable materials.

8. Safety is extremely important. For more information, please see the Disclaimer.

💡 Discharging methods:

1) Slow

Place battery in Phantom and turn on. Leave on until there is less than 8% of power left or until the battery can no longer be turned on. See DJI VISION App for battery levels. Motors do not need to be turned on, reducing wear.

2) Quick

Fly the Phantom outdoors until there is less than 8% of power left or until the battery can no longer be turned on.

3 Preparing the Phantom 2 Vision+

The Phantom 2 Vision+ is a quadrotor with a built-in Flight Control System with integrated gimbal and camera. It features an FC Assistant Port, Camera Data Port and a specialized battery compartment for its flight battery. All these features make the Phantom 2 Vision+ easy to assemble and configure.

3.1 Introduction
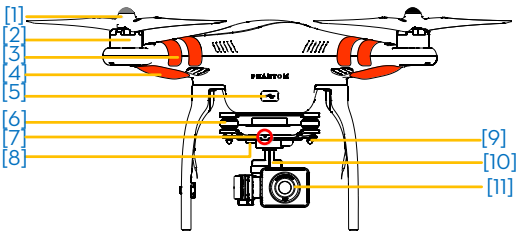
Figure 8
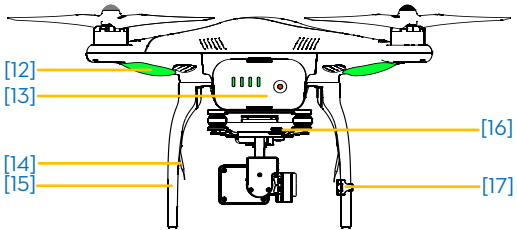
Figure 9
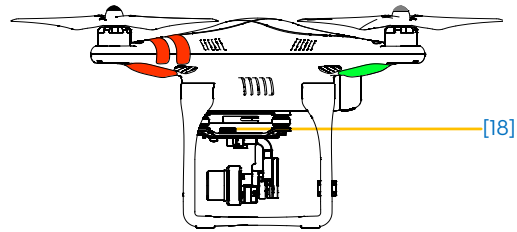
Figure 10

[1]	Propeller
[2]	Motor
[3]	Front Sticker
[4]	Front LED
[5]	FC Assistant Port (Micro-USB port)
[6]	Vibration Absorber
[7]	Camera LED Indicator
[8]	Camera Function Button
[9]	Anti-drop Kit
[10]	3-axial Stabilized Gimbal
[11]	Camera Lens
[12]	Rear LED Flight Indicator
[13]	DJI Smart Flight Battery
[14]	Receiver Antenna
[15]	Landing Gear
[16]	Camera Data Port(Micro-USB port)
[17]	Compass
[18]	Micro-SD Slot

3.2 Built-in Flight Control System

The Phantom 2 Vision+ is equipped with a DJI Naza-M V2 Flight Control System. This provides incredible ease of use and stability. Pilots can control the Phantom´s movements in many directions, including pitch (forwards and backwards), roll (left and right), elevator (up and down) and yaw (turn left or right). The flight control system also can provide IOC, Failsafe and battery level warnings.

Modules	Functions
Main Controller	Acts as the brains of the complete flight control system, responsible for connecting and controlling all the modules together.

IMU	Has a built-in inertial sensor and a barometric altimeter that measures both attitude and altitude.
GPS & Compass	The compass reads geomagnetic information and assists the GPS (Global Position System) to accurately calculate the position and height of the aircraft.
LED Flight Indicators	Indicates the status of flight control system.

FC Assistant Port

The flight control system communicates with the PC Assistant Software through a Micro-USB cable between the Phantom FC Assistant Port and the PC. Users can use Assistant Software to configure the aircraft and upgrade the Phantom firmware. Please refer to Using the Phantom 2 Vision+ Assistant Software (Page 68) for details.

3.3 LED Flight Indicator Descriptions

LED flight indicators are found at the front and the rear of the Phantom. Front LEDs are for indicating where the nose of the aircraft is. They light up solid red after motors have started spinning. Rear LED Flight Indicators light up to show the aircraft´s current flight status once the flight battery is powered on. For details, please see the below table.

Front LEDs

Rear LED Flight Indicators
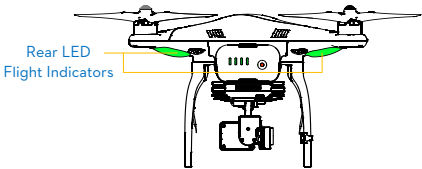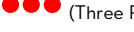
Figure 11   Figure 12

Rear LED Flight Indicators	Normal	Notes
(Red, Green, Yellow flashing in turn)	Power On Self-Test	
(Green, Yellow flashing in turn)	Warming Up	Aircraft cannot take off.
(Slow Green flashing)	Ready to Fly	More than 6 GPS satellites found.
(Slow Yellow flashing)	Ready to Fly (non-GPS)	Less than 6 GPS satellites found.
Rear LED Flight Indicators	**Abnormal**	**Notes**
(Quick Yellow flashing)	Remote Controller Signal Lost	Refer to Failsafe Function (Page41) for details.
(Slow Red flashing)	Low Battery Level Warning	DJI VISION App will also show warning message.
(Quick Red flashing)	Critical Low Battery Level Warning	DJI VISION App will show warning message.
(Three Red flashing off and on)	Not Stationary or Sensor Bias is too big	Keep aircraft stationary or perform IMU calibration.

(Solid red)	Error*	Cannot fly.
●●●●● (Red, Yellow flashing in turn)	Compass Needs Calibration	Refer to Calibrating the Compass (Page38) to get details.

⚠️ If a solid red � LED indicator appears, connect to the Phantom 2 Vision+ Assistant Software for details and resolution. This may be caused by:

1) IMU calibration required: Recalibrate IMU using Assistant Software.

2) IMU is abnormal: Repair required.

3) Compass is abnormal: Repair required.

4) Remote controller mid-point is set abnormally: Refer to How to solve large margin(s) mid-point error (Page 73).

3.4 3-axial Stabilized Gimbal

The 3-axial stabilized gimbal of the Phantom 2 Vision+ will power on and self-check each time the flight battery is installed and powered on. Its pitch can be controlled using the DJI VISION App. This gimbal has two working modes, video mode and FPV mode, with the video mode set as default. This can be configured inside Phantom 2 Vision+ Assistant Software or the DJI VISION App.
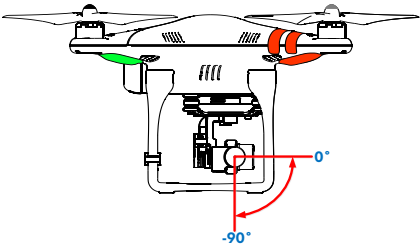
Figure 13

Gimbal specifications	
Control accuracy	±0.03°
Controllable range	Pitch : -90°~0°
Maximum angular velocity	Pitch : 90°/s

🔍 **Video Mode**: the gimbal will stabilize across 3-axial for smooth aerial creativity.

FPV Mode (First Person View Mode): Gimbal will lock to the movements of the Phantom for a true FPV experience.

Anti-drop Kit

The Anti-drop Kit helps keep the gimbal and camera connected to the aircraft. Two have been mounted on delivery. If new ones are required, take the gimbal and press part ① through the center hole of the Vibration Absorber the center hole of part ②. Lock them together as shown in ③. Mounting the Anti-drop Kit diagonally is recommended.
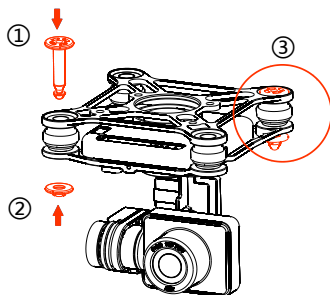
Figure 14

> ⚠️ Once part ① and part ② are connected, the Anti-drop Kit cannot be disconnected and reused.

Micro-SD Slot

With flight battery powered off, make sure the Micro-SD card is inserted correctly into the Micro-SD Slot before taking any photos or recording any video.
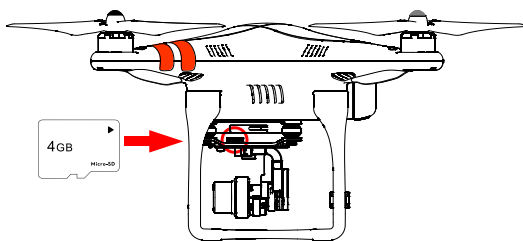
Figure 15

The Phantom 2 Vision+ comes with a 4GB Micro-SD card and can support cards up to 32GB. The DJI VISION App may not be able to read some Micro-SD cards. Using the DJI VISION App to reformat new Micro-SD cards is recommended.

Refer to for details.

> 🚫 Do not insert or remove Micro-SD card when flight battery is powered on.

Gimbal Error Warning

Before the aircraft takes off, if a gimbal motor error is detected or the gimbal clamp is not removed, there will be a warning prompt on the camera page of the DJI VISION App. This will disappear after the problem is resolved.
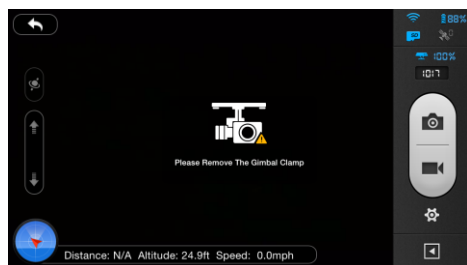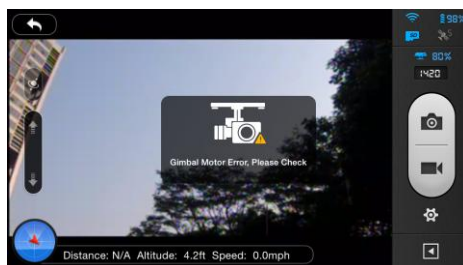
| Figure 16 | Figure 17 |

	(1)	Remove Gimbal Clamp before powering on flight battery.
⚠️	(2)	Gimbal motor error may occur in these situations: (1) Gimbal is placed on uneven ground. (2) Gimbal has received an excessive external force, e.g. a collision.
		Please take off from flat, open ground and protect the gimbal after powering up.
		Flying in heavy fog or cloud may make the gimbal wet, leading to a temporary failure. The gimbal will recover when it dries out.

3.5 Camera

The Phantom 2 Vision+ camera powers up when the flight battery has been installed and switched on. Photos and videos can be shot by pressing either the onboard button or the DJI VISION App. For aerial photography it supports burst shots, continuous capture and timed capture, and exports to both Adobe DNG Raw and JPEG. For aerial video, it shoots in full HD at (1080p30/1080i60) and can even shoot 720p60 for internet ready slow motion.

Camera specifications	
Sensor Size	1/2.3"
Pixels	14 Megapixels
Resolution	4384×3288
HD Recording	1080p30 /1080i60/720p60
Recording FOV	110° / 85°

Lens cap removal

Remove lens cap before use and replace it when shooting is complete to protect the camera lens.
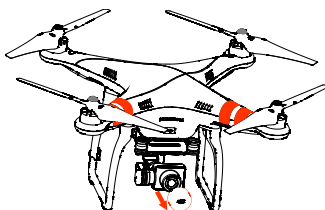
Figure 18

Camera Function Buttons

Capture: Press (hold less than 2 seconds) to take a single capture.

Record: Press (hold longer than 2 seconds) to begin recording. Press again to stop.

Camera Data Port

Connect the Camera Data Port to a PC using a Micro-USB cable to copy photos and videos to a PC.
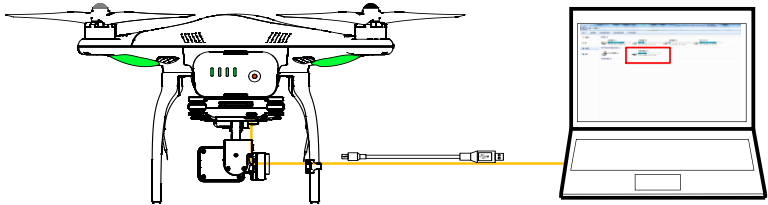
Figure 19

⚠️ Photos and videos can only be copied when the flight battery is powered on.
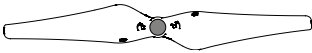
Camera LED Indicator

Camera LED Indicator lights up after the flight battery is powered on. It provides information on the working status of the camera.

Camera LED Indicator	Wi-Fi status	Camera status
🟢 Solid	OFF	Power On; Idle
🟢 Slow Blink (0.2s on, 1.8s off)	ON	Idle
🟢 Blink (0.1s on, 0.3s off, 0.1s on, 1.8s off)	ON	Micro-SD card connected to PC
🟢 Fast Blink (0.1s on, 0.3s off)	ON	Synchronizing
🟡 Solid	OFF	Recording
🟡 Blink Once (0.2s on, 0.3s off)	ON/OFF	Taking a single picture.
🟡 Blink 3 Times(0.1s on, 0.1s off)	ON/OFF	Taking 3 or 5 photos per shot
🟡 Fast Blink (0.1s on, 0.3s off)	ON/OFF	Firmware Upgrading
🟢🟡 (0.2s green, 1.8s yellow)	ON	Recording
🔴 Solid	ON/OFF	Critical error
🔴 Slow Blink (0.2s on, 1.8s off)	ON/OFF	CMOS sensor error
🔴 Blink Once (0.2s on, 0.3s off)	ON/OFF	Operation failed
🔴 Blink 3 Times(0.1s on, 0.1s off)	ON/OFF	Micro-SD card error
🔴 Fast Blink (0.1s on, 0.3s off)	ON/OFF	Upgrade error
🟢🟡🔴 (0.5s green, 0.5s yellow, 0.5s red, 0.5s Off)	ON/OFF	Overheated Camera

4 Attaching the Propellers

Always use original 9-inch propellers, classified by the color of each central nut.

4.1 Introduction

Propellers	Grey Nut (9443)	Black Nut (9443 R)
Diagram		
Assembly Location	Attach to motor without black dot.	Attach to motor with **black dot**.
Fastening/Un-fastening Instructions	Lock: Tighten propeller in this direction. Unlock: Loosen propeller in this direction.	

4.2 Assembly

1. (Figure 20) Remove warning cards from motors after you have read them.
2. (Figure 21) Spin grey marked propellers clockwise onto unmarked motors and black marked propellers anti-clockwise for black marked motors.
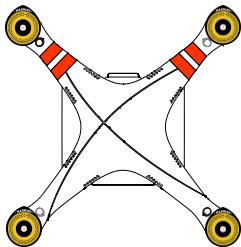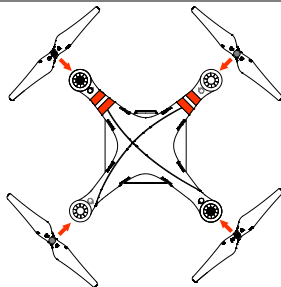
Figure 20   **Figure 21**

⊘	Propellers self tighten during flight. DO NOT use thread locker.
⚠	(1) Always match marked props with the corresponding motor. (2) Protective gloves are recommended during propeller assembly and removal.

4.3 Removing the Propellers

(Figure 22) Prevent motor rotation using the included wrench or a hand, then remove propeller according to the un-fastening instructions.
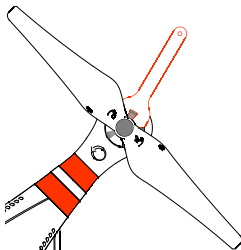
Figure 22

4.4 Notes

1. Check that propellers and motors are installed correctly and firmly before every flight.

2. Ensure that all propellers are in good condition before each flight. DO NOT use any ageing, chipped, or broken propellers.

3. To avoid injury, STAND CLEAR of and DO NOT touch propellers or motors when they are spinning.

4. ONLY use original DJI propellers for a better and safer flight experience.

For beginner flyers, PHANTOM 2 Prop Guards are recommended. Contact your authorized dealer or DJI customer service to purchase if necessary.
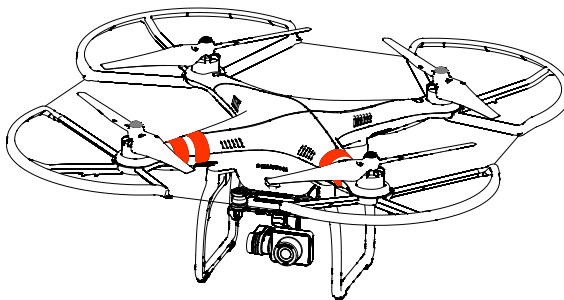
Figure 23

5 Preparing the Remote Controller

The Phantom 2 Vision+ Remote Controller is a wireless communication device using the 5.8GHz frequency band. Remote Controller and Phantom are paired before delivery.

The Remote Controller is set to Mode 2 by default. This can be adjusted in the PHANTOM RC Assistant Software. See Using the PHANTOM RC Assistant Software (Page 69) for details. You can also adjust the power of your Remote Controller according to national regulations. Please refer to Compliance Version Configuration (Page 27).

🔍	**Compliance Version**: The Phantom 2 Vision+ Remote Controller is compliant with CE and FCC (see the FCC ID) regulations. **Operating Mode**: Mode 1 and Mode 2 refer to different channel mappings. **Mode 1**: The right stick controls throttle. **Mode 2**: The left stick controls throttle.
💡	The Range Extender and Phone Holder are already mounted on the Remote Controller. Twist the Phone Holder to face outwards and fix it in position for mobile device installation.
🚫	Large smartphones and tablets are not recommended for the Phone Holder as they do not fit.

5.1 The Remote Controller
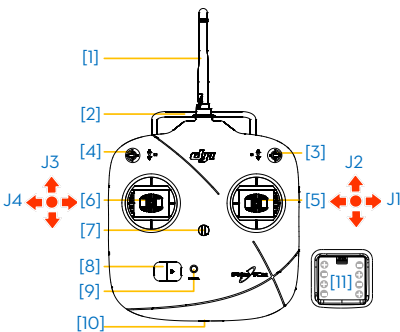
Figure 24

[1]	Antenna
[2]	Carrying Handle
[3]	Switch S1
[4]	Switch S2 (Reserved)
[5]	Right Stick (J1: Roll [left & right], J2: Pitch [front & back])
[6]	Left Stick (J3: Throttle [up & down], J4: Yaw [rotation])
[7]	Neck Strap Attachment
[8]	Power Switch
[9]	Power LED
[10]	RC Assistant Port(Micro-USB Port)
[11]	Battery Compartment (On the back)

5.2 Power on the Remote Controller

1. Install four AA batteries into the battery compartment on the back of the Remote Controller. Pay attention to positive and negative.
2. Set S1 and S2 switches to the upper most position and place all sticks in the mid-point.
3. Toggle power switch to the right to switch on.
4. The Remote Controller will then beep. If it is set to CE compliance, then there will be one beep while the FCC compliant version will beep twice. The Power LED will blink green quickly indicating that the Remote Controller and receiver are binding. Once binding is completed, the Power LED will change to a
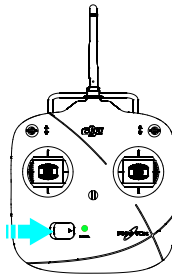
solid green.

Figure 25

5.3 Remote Controller Power LED Status Information

Power LED	Sound	Remote Controller State
▬▬▬	**None**	Functioning normally.
●●●●●●	**None**	Establishing a link between the Remote Controller and the receiver.
● ● ● ●	**B-B-B......**	Low voltage (at 3.9V-4.5V). Replace batteries as soon as possible.
●●●●●●	**BBBB**	Low voltage (lower than 3.9V). Remote Controller will automatically power off. Replace batteries immediately.
● ● ● ●	**B--B--B......**	Remote Controller has not been operated for 15 minutes. Turn off or use the Remote Controller.

⚠️ The Remote Controller Power LED will blink red and sound an alert when the voltage drops below 3.9V and automatically power off after 3 seconds. This process will repeat even if you power cycle the Remote Controller. If this low voltage warning occurs during flight, it will cause the Phantom to enter Failsafe mode which cannot be interrupted (refer to Failsafe Function (Page41) for details). Replacing batteries immediately after the low voltage warning (3.9V-4.5V) is strongly recommended.

5.4 Antenna Orientation

Keep the antennas pointing skyward, perpendicular to the ground for maximum communication range during flight.

For maximum range and reliability, Remote Controller antenna should point skywards with no obstructions between it and the Phantom. Obstacles may cause Return to Home to trigger. Phone Holder and Range Extender should not block the antenna.
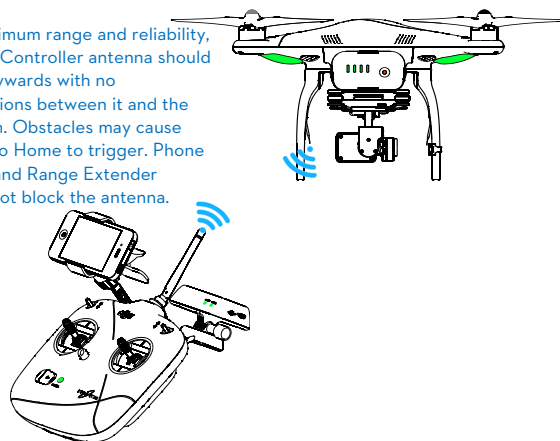
Figure 26

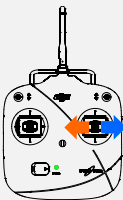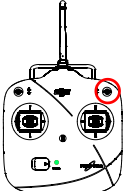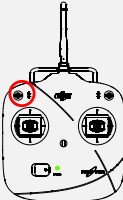## 5.5 Remote Controller Operation

The Remote Controller default is set to Mode 2 by default.

> **Stick Neutral/ mid point**: Control sticks of the Remote Controller are placed at the central position.
>
> **Move the Stick**: The control stick is pushed away from the central position.

Remote Controller (Mode 2)	Aircraft (◀ indicates nose direction)	Operation details
		Vertical movements on the left stick control elevation. Push the stick up to ascend and down to descend. When both sticks are centered the Phantom will hover in place. Push the throttle stick upward beyond the centered (neutral) position to take off. Push the throttle gently to prevent sudden and unexpected elevation.
		Horizontal movements on the left stick control the rudder. Push left to rotate counter clock-wise and right for clockwise. If the stick is centered, the Phantom will fly straight. The more the stick is moved, the faster the Phantom will rotate.
		Vertical movements on the right stick control forward and backward pitch. Push up to fly forward and down to fly backward. The Phantom will hover in place if the stick is centered. Push the stick further for a larger pitch angle (maximum 35°) and faster flight.

		Horizontal movements on the right stick control left and right pitch. Push left to fly left and right to fly right. The Phantom will hover in place if the stick is centered. Push the stick further for a larger pitch angle (maximum 35°) and faster flight.
	 Position 1 Position 2 Position 3	The S1 switch is used for compass calibration. Toggle the S1 from position 1 to position 3 and back approximately 5 times to enter into compass calibration mode. In Naza-M mode, the S1 switch is used to switch between control modes and enter compass calibration.
	 Position 1 Position 2 Position 3	S2 is used to record a Home point manually. After a Home point has been recorded automatically, flipping S2 from position 1 to position 3 and back 5 times (or more) rapidly will move the Home point to the Phantom´s current location. In Naza-M working mode, S2 is be used for IOC.

⚠️ (1) In `Ready to Fly´ mode, the Phantom will hover when all sticks are released.

(2) In `Ready to Fly (non-GPS)´ the Phantom will lock its altitude but will not have horizontal positioning.

5.6 Linking the Remote Controller and Receiver

A 5.8G receiver is built in to the Phantom 2 Vision+. Its link button and indicator are located on the underside of the phantom, as shown in Figure 27.

The Remote Controller and the receiver are paired before delivery. Only use this button if you have replaced your Remote Controller or receiver.
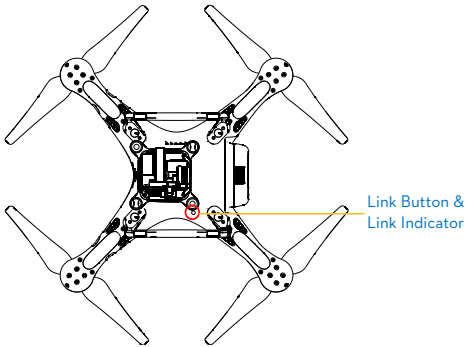

Link Button & Link Indicator

Figure 27

Linking Procedures

1.	Power off the Remote Controller, power on the aircraft. You will see the link indicator blinking red.
2.	Press the link button with a thin object and hold until the link indicator blinks yellow. Release the link button.
3.	Power on the Remote Controller. Link indicator will switch off, showing that a link has been successfully established.

Link Indicator

Link Indicator	Description	Next Operation
● ● ● ● ●	No signal received.	Switch on the Remote Controller or perform a link procedure.
● ● ● ● ●	Ready to link.	Switch on the Remote Controller.

5.7 Compliance Version Configuration

As power levels vary between regulators, the Phantom Remote Controller's power output can be adjusted by twisting the potentiometer knob (Figure 28) on the back of the Remote Controller using a flathead screwdriver. For CE compliance, set the Remote Controller to CE with a full counterclockwise turn. For FCC compliance, set the Remote Controller to FCC with a full clockwise turn. Be sure to follow relevant local regulations.

Compliance can be configured using the PHANTOM RC Assistant Software. Select CE compliance version in Assistant Software to set it, or do the same with FCC compliance version.
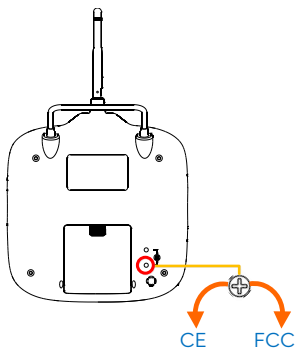

Figure 28

	(1)	Turn the potentiometer knob gently to avoid damage.
	(2)	CE compliant devices have an effective communication range of 400 meters in open spaces due to power limitations.
⚠	(3)	FCC compliant devices have an effective range of 800 meters in open spaces.
	(4)	Watch your flight distance as the Phantom 2 Vision+ will enter Failsafe mode (auto-landing or go home and land) if it flies beyond the relevant range limits.
	(5)	Always follow local laws and regulations.

(1) It is recommended to use a Φ2.4mm flathead screwdriver for adjustments.

(2) There is another potentiometer for reserved use.

6 Preparing the Range Extender

The Phantom 2 Vision+ Range Extender is a wireless communication device that operates within the 2.4 GHz frequency band. It is used to extending the effective range of communication between a Smartphone and the Phantom 2 Vision+. In an open, unobstructed area, the transmission distance can reach up to 700 meters. This can be reduced by trees, buildings and other sources of the same frequency. Before every flight, it is suggested that you ensure the Range Extender is functioning properly; otherwise communication issues between the mobile device and the Phantom 2 Vision+ may occur.

Each Range Extender has a unique MAC address and network name (SSID), details of which are printed on the label as `Phantom_XXXXXX`. The `XXXXXX` represents the last 6 letters or numbers of the MAC address for the Range Extender. This can be renamed in the DJI VISION App.
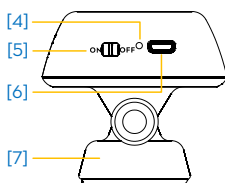
6.1 Introduction
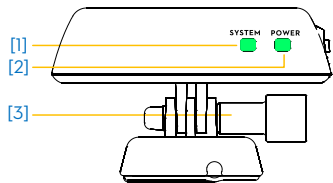
Figure 29   **Figure 30**

[1]	SYSTEM Indicator
[2]	POWER Indicator
[3]	Lock-screw
[4]	Binding Reset Button
[5]	Power Switch
[6]	Charging Port(Micro-USB port)
[7]	Mounting Bracket

SYSTEM Indicator

Shows Wi-Fi status of the Range Extender.

SYSTEM Indicator	Description
● ● ● ●	The Wi-Fi network is functioning normally.
Off	The Wi-Fi network is functioning abnormally.

POWER Indicator

Shows power levels of the Range Extender.

POWER Indicator	Description
(green)	Fully charged.
(red)	Low voltage alert, re-charge required.
(yellow)	Charging.

⚠️ If the power indicator is a solid red light, the Ranger Extender may stop working at any moment. Land and recharge as soon as possible.

Binding Reset Button

When the Binding Reset Button is pressed, it will reset and restart the Range Extender. You will need to bind it with

the Phantom 2 Vision+ again to recreate its Wi-Fi network. Failure to do so will cause the DJI VISION App to fail to connect with the camera.

6.2 Use

Charging the Range Extender

Charge the Range Extender by connecting the charging port to a power supply device such as a PC or a USB charger using a Micro-USB cable. Make sure to charge the Range Extender completely before using it for the first time. This takes 3~4 hours depending on USB power output.

⚠️   Make sure the Range Extender has enough power before each use.

Powering on the Range Extender

1.   Flick the power switch to the ON position.
2.   Wait for approximately 30 seconds. The Wi-Fi signal indicator will blink green indicating the Range Extender is communicating properly.
3.   Keep the Range Extender facing the aircraft during flight for the best communication link.

⚠️   Power off the Range Extender after every flight to avoid discharging the battery.

Checking the Battery Level

The battery level of the Range Extender can be checked in the camera page of the DJI VISION App as shown below. When the battery level drops to 20% or lower, the battery level icon will go red as a charging reminder.
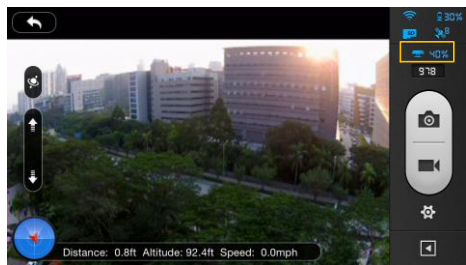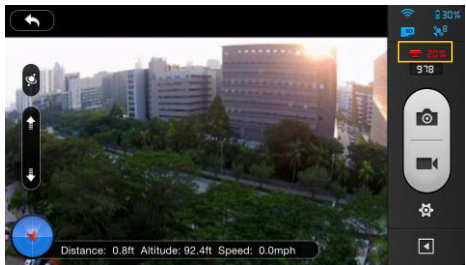
| Figure 31 | Figure 32 |

6.3 Renaming the Range Extender SSID

Make your Range Extender SSID easier to remember by changing its name..
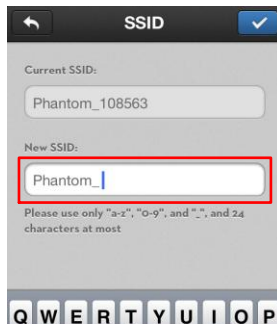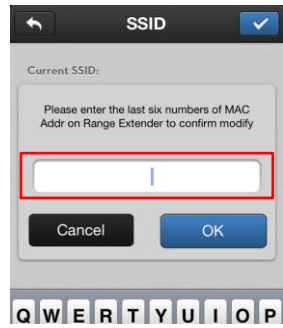
| Figure 33 | Figure 34 | Figure 35 |

1. Tap "Rename SSID of Range Extender" in the Settings page. Enter a new name SSID name (e.g. Phantom_Tom) in the textbox.

2. Tap and you will be asked to enter the last six characters of your MAC address on the Range Extender to confirm the change. The MAC address can be found on the sticker on your Range Extender. If your MAC address is 60:60:1F:60:41:E7, then enter 6041E7.

3. Tap "OK" to confirm the change. The Range Extender will automatically restart and the App will return to the settings page. Approximately 30 seconds later, the new network name can be found in the Wi-Fi list of your mobile device. Select and connect the renamed network to use the DJI VISION App.

6.4 Binding the Phantom 2 Vision+ and Range Extender

If the connection between the Phantom 2 Vision+ and the Range Extender fails, or one of them needs to be repaired or replaced, a camera and Range Extender binding will need to be performed through the DJI VISION App.

Binding
Reset Button
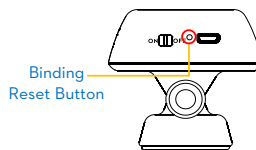
Figure 36

1. Power on the camera and Range Extender.

2. Approximately 30 seconds later, press the Binding Reset Button on the Range Extender with a thin object until the SYSTEM Indicator turns off. The Range Extender will then restart automatically.

3. Approximately 30 seconds later, the SYSTEM Indicator will start to blink green, indicating that the Range Extender is ready for binding.

4. Enable Wi-Fi on your mobile device then select "Phantom_XXXXXX" the (SSIDof your Range Extender) from theWi-Fi network list.

5. (Figure 37) Run the DJI VISION App then tap -> Settings -> General -> Binding. (Figure 38) Select ´Scan

QR Code ' to scan the camera QR code on the product packaging. (Figure 39) Get the camera SSID (E.g. FC200_xxxxxx) and the MAC address. You can also skip the scan and enter the camera MAC address directly (Figure 38, Figure 40). The MAC address can be found on the camera label.

6. Tap the tick ☑ in the top right corner. The Range Extender should automatically restart. Binding is now complete.
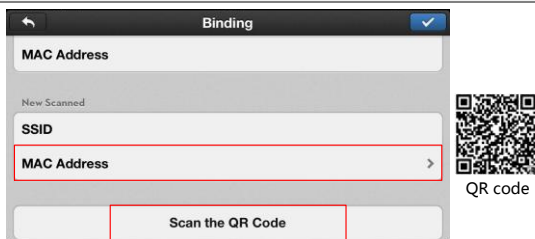
Figure 37

Figure 38

QR code

Figure 39

Figure 40

🚫 DO NOT push the Binding Reset Button of the Range Extender unless you are ready to rebind the Range Extender and the camera. This will unbind your camera so you must follow the steps above for rebinding.

⚠️ If both the Phantom 2 Vision+ and the Range Extender are powered on and working normally, you will be able to find the SSID on the Wi-Fi list of your mobile device.

💡 (1) The QR code is located on the bottom cover of the Phantom 2 Vision+. If you cannot find the QR code, please contact DJI customer service and provide your camera serial number (printed on the label of the camera) so they can generate a new QR code for you.

(2) Photographing and saving the QR code is recommended to prevent loss.

7 Downloading and Installing the DJI VISION App

7.1 Download and Install

Download and install methods	
[QR code]	Scan the QR code to get the download link. Download and install the DJI VISION App on your mobile device. You can find the QR code on the `Quick Start Guide` as well as on the packaging of the Phantom 2 Vision+.
iOS user	Search "DJI VISION" on the App Store, download and install on your mobile device.
Android user	Search "DJI VISION" on Google Play, download and install on your mobile device.

Supported mobile devices	
iOS (iOS6.1 or above)	Recommended: iPhone4S, iPhone5, iPhone5S, iPhone5C, iPod Touch4, iPod Touch5; Available but not recommended: iPad3, iPad4, iPad mini, iPad Air.
Android (4.0 or above)	Samsung Galaxy S3, S4, Note2, Note3 or mobile devices of similar configuration.

🔍	DJI continues to support many mobile devices and any information from users are welcome. Please send any questions or queries to the following mailbox: phantom2vision@dji.com.
⚠	The DJI website is regularly updated. Check back often for latest App updates.

7.2 Register and Login

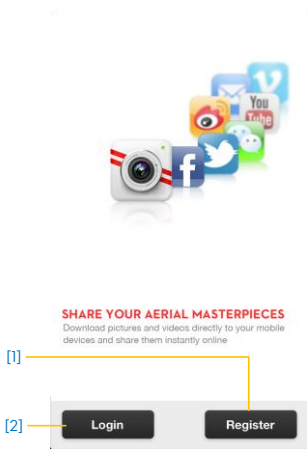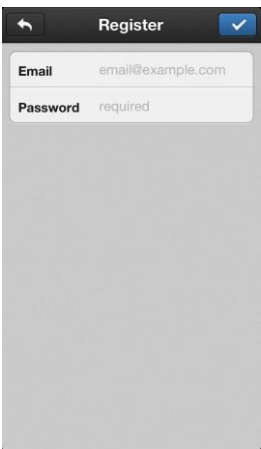Access the Internet to register and login.
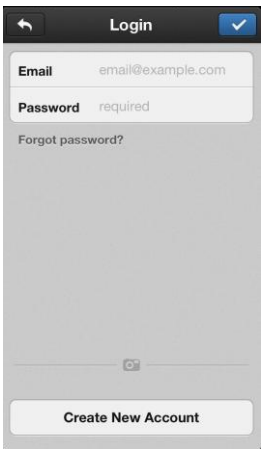

| Figure 41 | Figure 42 | Figure 43 |

[1] Register

Tap `Register` to enter the registration page. Fill in your Email and Password information and then tap ✅ to create a new account.

💡	The DJI account works with all DJI Assistant Software and Apps.

[2] Login

Tap `Login´ to enter the login page. Fill in your registered Email and Password and then tap [✓] to login.

⚠	Log in to your account the first time you use the DJI VISION App.
💡	Tap "Forgot Password" if you have forgotten your login details.

[3] Usage tips

Useful tips will display when you enter the welcome page. Tap the screen to display the next useful tip.

Figure 44

💡   Enable the "Tutorial" switch in the Settings page to get hints and tips the first time you use the DJI VISION App.

Figure 45

8 Connecting the Camera

Before flight, always connect your smartphone to the Phantom´s Wi-Fi network. This is required for the camera control and FPV.

8.1 Connecting Procedures

Follow these instructions to connect a mobile device to the Phantom 2 Vision+ camera.

1. Power on the Remote Controller and the Range Extender.

2. Power on the Phantom 2 Vision+.

3. (Figure46) Enable the Wi-Fi on your mobile device; wait for about 30 seconds, and then select "Phantom_XXXXXX" from theWi-Fi network list.

4. (Figure47) Run the DJI VISION App on your mobile device. When the Wi-Fi connection indicator on the App main menu goes green, the connection is good.

5. Tap the "CAMERA" icon and the DJI VISION App will begin a live camera preview (Figure48). This means everything is functioning normally.
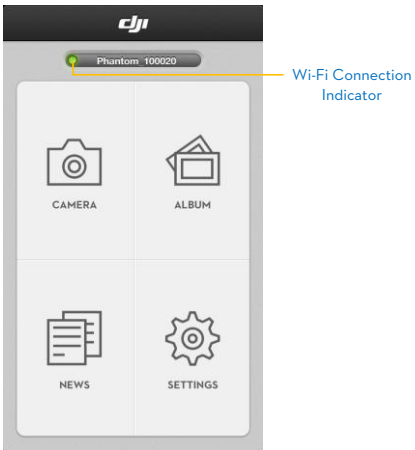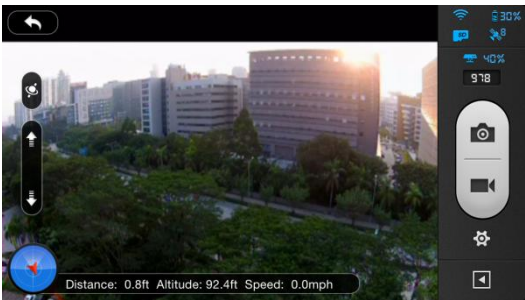
Enable Wi-Fi

Select Phantom_XXXXXX

Wi-Fi Connection Indicator
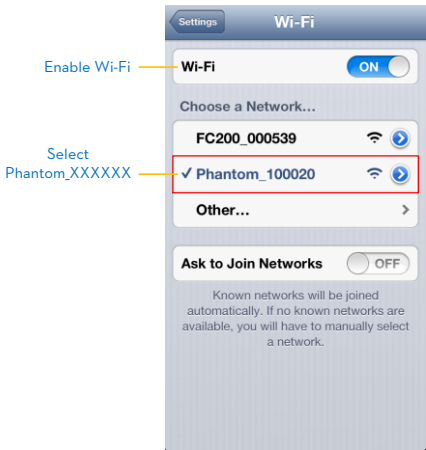
Figure 46   **Figure 47**

Figure 48

Wi-Fi Connection Indicator Description

Icon		Description
🟢	Solid green	Wi-Fi is connected to the Phantom 2 Vision+.
🔵	Solid blue	Wi-Fi is connected to another Wi-Fi network, not to the Phantom 2 Vision+.
⚫	Off	No Wi-Fi connection.

⚠️	(1) The SSID is unique for each Phantom 2 Vision+ It will appear as Phantom_XXXXXX in your Wi-Fi list. (2) Android users can tap the SSID button on the main page to mobile device Wi-Fi settings directly.

Flight

Once pre-flight preparation is complete, it is recommended to carry out the tasks in the *Phantom Pilot Training Guide* to prepare for more complex flight maneuvers and learn to fly safely. Ensure that all flights are carried out in a suitable location.

Flight Environment Requirements

1. Do not use the aircraft in severe weather conditions. These include wind speed exceeding category 4, snow, rain and smog.

2. Fly in open fields as high buildings or steel structures may affect the accuracy of the onboard compass.

3. Keep the Phantom away from obstacles, crowds, high voltage power lines, trees or bodies of water when in flight.

4. Reduce the chance of electromagnetic interference by not flying in areas with high levels of electromagnetism, including base stations or radio transmission towers.

5. The Phantom cannot operate within the polar areas.

6. Do not fly the aircraft within no-fly zones specified by local laws and regulations.

Preflight Checklist

1. Remote Controller, smart battery, Range Extender and smartphone are fully charged.

2. Propellers are mounted correctly.

3. Gimbal clamp has been removed.

4. Damping absorbers are in good condition, not broken or worn.

5. Anti-drop kits have been mounted correctly.

6. Camera lens cap has been removed.

7. Micro-SD card has been inserted if necessary.

8. Gimbal is functioning as normal.

9. Motors can start and are functioning as normal.

10. DJI VISION App can connect to the camera.

1 Calibrating the Compass

IMPORTANT: Make sure to calibrate the compass in every new flight location. The compass is very sensitive to electromagnetic interference, which can cause abnormal compass data leading to poor flight performance or even flight failure. Regular calibration is required for optimum performance.

> (1) DO NOT calibrate your compass where there is a chance of strong magnetic interference, such as magnetite, parking structures, and steel reinforcements underground.
>
> (2) DO NOT carry ferromagnetic materials with you during calibration such as keys or cellular phones.
>
> (3) DO NOT calibrate beside massive metal objects.

1.1 Calibration Procedures

Choose an open space to carry out the following procedures. Watch the Phantom 2 Vision+ quick start video for more details.
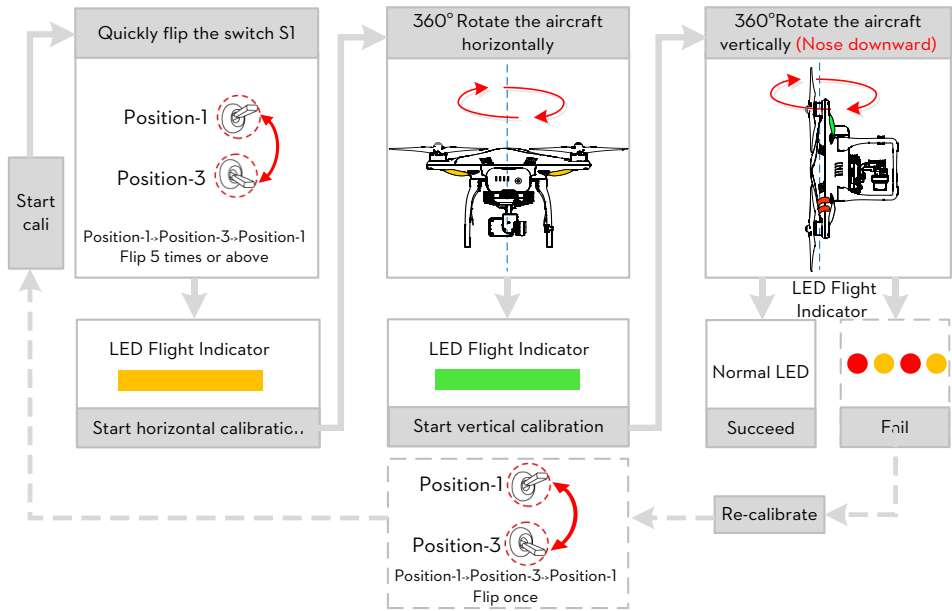
Figure 49

> If compass calibration is needed before flight, a prompt will appear on the DJI VISON App´s camera page. It will disappear after successful calibration.

1.2 When to Recalibrate

1. When compass data is abnormal, the rear LED flight indicator will blink red and yellow.

2. Flying in different location to last flight.

3. Mechanical structure of the Phantom has changed, i.e. changed mounting position of the compass.

4. Severe drifting occurs in flight, i.e. Phantom does not fly in straight lines.

2 Starting/Stopping the Motors

2.1 Starting Motors

A Combination Stick Command (CSC) is used to start the motors instead of simply pushing the stick up. (Figure 50)

Push both sticks to their bottom corners to start the motors. Once the motors have spun up, release both sticks simultaneously.
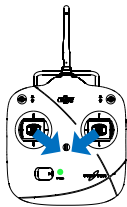

Figure 50

2.2 Stopping Motors

There are two methods to stop the motors.

Method 1: When the Phantom has landed, push the throttle down, then conduct CSC. Motors will stop immediately. Release both sticks once motors stop.
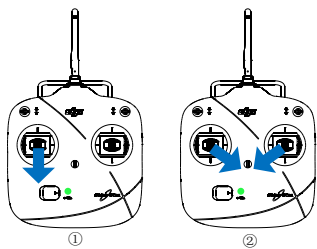
Figure 51

Method 2: When the aircraft has landed, push the throttle down and hold. Motors will stop after 3 seconds.
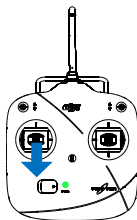

Figure 52

⊘	Do not execute CSC during normal flight. This will stop the motors and cause the aircraft to drop without control.
🔍	Conduct the CSC as neatly as you can. Release the sticks once motors start/stop.

3 Flight Test

3.1 Take off/Landing Procedures

1. Place the Phantom 2 Vision+ on open flat ground with battery indicators facing towards you.

2. Power on the Remote Controller and Range Extender, then the Smart Flight Battery.

3. Launch the DJI VISION App and start bind it with your smartphone then enter the camera preview page.

4. Wait until the Rear LED Flight Indicator blinks green. This means it has initialized and is Ready to Fly. If it flashes yellow, it is in Ready to Fly (non-GPS) mode and will require more careful flight. Execute the CSC command to start motors.

5. Push the throttle up slowly to take off. Refer to Remote Controller Operation (Page 25) for more details.

6. Shoot photos and videos using the DJI VISION App. Refer to DJI VISION App Usage (Page 48) for more details.

7. To land, hover over a level surface and gently pull down on the throttle gently to descend.

8. After landing, execute the CSC command or hold the throttle at its lowest position for 3 seconds or more until the motors stop.

9. Turn off the smart battery, Range Extender and Remote Controller.

⚠️ (1) When the Rear LED Flight Indicator blinks yellow rapidly during flight, the aircraft has entered Failsafe mode. Refer to Failsafe Function (Page 41) for details.

(2) A low battery level warning is indicated by the Rear LED Flight Indicator blinking red slowly or rapidly during flight. Refer to the Low Battery Level Warning Function (Page) for details.

(3) View tutorials about flight for more flight information: www.dji.com/phantom2visionplus/training.

3.2 Video Suggestions and Tips

1. Work through the check list before each flight.

2. Set the gimbal working mode to Stabilized.

3. Aim to shoot when flying in Ready to Fly only.

4. Always fly in good weather, such as sunny or windless days.

5. Change camera settings to suit you. These include FOV, photo format and exposure compensation.

6. Take flight tests to establish flight routes and scenes.

7. Push the sticks gently to make aircraft movements stable and smooth.

4 Failsafe Function

The Phantom will enter Failsafe mode when its connection to the Remote Controller is lost. The Flight Control System will automatically control the aircraft to return to home and land to prevent injury or damage.

> **Home Point:** When the Phantom enters 'Ready to Fly' from the `Ready to Fly status (non-GPS)´, the GPS coordinates will be recorded and set as the home point.
>
> 1) When Remote Controller signal is lost, the aircraft will return to the recorded home point coordinates and land.
>
> 2) Home point coordinates are used to calculate the horizontal distance of the aircraft (shown as "Distance" on the GUI of the DJI VISION App).
>
> 3) After successfully record the home point, rear LED flight indicators blink fast green.

4.1 When will Failsafe Activate?

1. The Remote Controller is powered off.
2. The Phantom has flown out of effective communication range.
3. The signal between the Remote Controller and the Phantom has been blocked.
4. There is interference causing a signal problem with the Remote Controller.

4.2 Failsafe Procedure

Initiating the Failsafe mode from different flying statuses will results in different landing processes.

Ready to Fly (non-GPS) ---- Automatic landing

The Flight Control System will keep the aircraft level during descent and landing. It may be drift during the descent and landing process.

Ready to Fly ---- Automatic go home and land

The Flight Control System will automatically control the aircraft to fly back to the home point and land.

The below demonstrates the complete Ready to Fly Failsafe landing process.
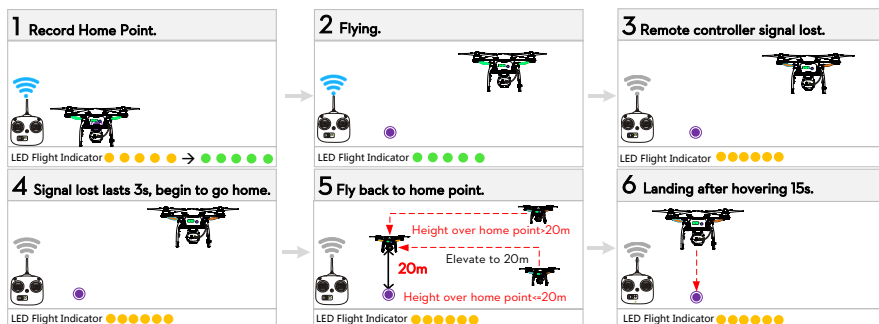
Figure 53

> ⚠ (1) To ensure the aircraft successful return to home after Failsafe activation, aim to only fly in Ready to Fly mode.

|	
	(2) The Phantom will automatically descend during the Failsafe process if there are less than 6 GPS satellites detected for more than 20 seconds. (3) The aircraft cannot avoid obstacles during Failsafe.
💡	Quickly flipping the S2 switch of the Remote Controller from top to bottom 5 times or more will reset the current aircraft position as a new home point. Rear LED flight indicators will blink green rapidly when successful.

Failsafe on the DJI VISION App

The DJI VISION App will provide information during Failsafe.
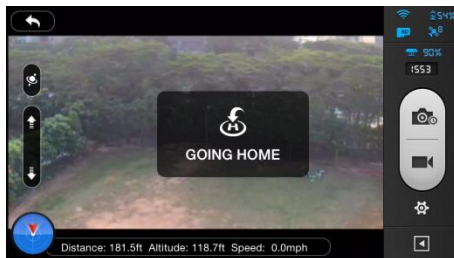
Figure 54	**Figure 55**

4.3 Regaining Control During Failsafe Procedures

Position of Switch S1	Position-1	Position-2	Position-3
How to regain control	When the S1 switch is switched to Position-1, toggle the S1 switch to any other position once to regain control. If the Remote Controller signal is recovered, control is returned to the pilot.	Regain control as soon as signal is recovered.	

5 Low Battery Level Warning Function

The low battery level warning alerts users when the battery is close to depletion during flight. When it appears, users should promptly fly back and land to avoid accidental damage. The Phantom 2 Vision+ has two levels of low battery level warning. The default battery level warning thresholds are 30% (low battery level warning) and 15% (critical low battery level warning) respectively.

Battery Level Warning	Rest Battery Level	Rear LED Flight Indicator	DJI VISION App	Flight Instructions
Low battery level warning	≤threshold of low battery level warning	●●●●● Slow red blinks	The battery level icon will become red (e.g. 28%), and a red rectangle will blink on the camera screen.	Fly the Phantom 2 Vision+ back and land it as soon as possible, stop motors and replace the battery.
Critical low battery level warning	≤threshold of critical low battery level warning	●●●●● Fast red blinks	The battery level icon will become red (e.g. 12%), and a red rectangle will blink on the camera screen.	The Phantom 2 Vision+ will begin to descend and land automatically. After it has landed, stop motors and replace the battery.

💡	When the Phantom 2 Vision+ is descending and landing automatically, you are able to push the throttle upward to hover the aircraft and navigate it to a more appropriate location for landing.
⚠️	When a low battery warning is triggered, you must bring the aircraft back to the home point to avoid losing power during flight.

Low Battery Level Warning on the DJI VISION App

Battery level warnings will show on the camera page of the DJI VISION App when the battery level is low.

(1)   A red rectangle will blink on the camera screen.

(2)   Audible alarm. Make sure sound is turned on and volume is turned up on your mobile device.

(3)   The aircraft battery icon will turn red.

Figure 56

6 Flight Limits

All unmanned aerial vehicle (UAV) operators should abide by all regulations from such organizations as the ICAO (International Civil Aviation Organization) and their own national airspace regulations. For safety reasons, the flight limits function is enabled by default to help users use this product safely and legally. The flight limits function includes height, distance limits and No Fly Zones.

In Ready to Fly mode, height, distance limits and No Fly Zones work together to manage flight. In Ready to Fly (non-GPS) status, only height limits work and flights cannot go higher than 120m. **394 feet**

> 🔍 Default parameters in Assistant Software are compliant within the definitions of class G ruled by ICAO. (Refer to Airspace Classification to get more details). As each country has its own rules, make sure to configure these parameters to comply with these rules before flying.

6.1 Max Height & Radius Limits

Max Height & Radius limits flying height and distance. Configuration can be done in the Phantom 2 Vision+ Assistant (Figure 57). Once complete, your Phantom will fly in a restricted cylinder (Figure 58).
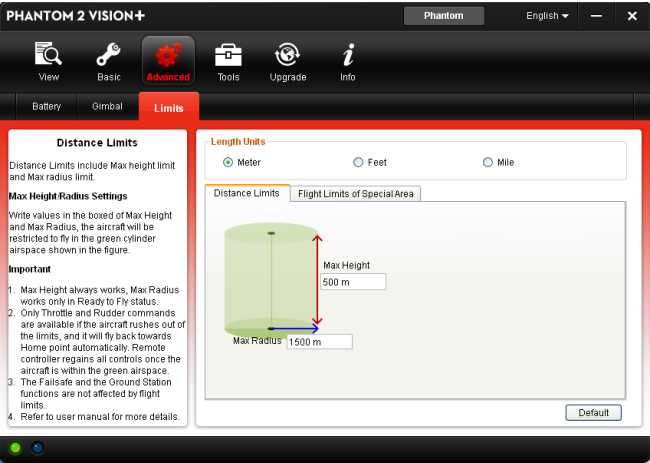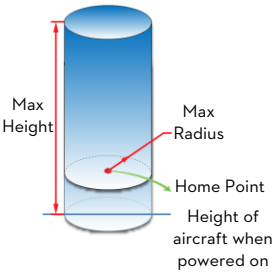
| Figure 57 | Figure 58 |

Ready to Fly 🟢🟢🟢🟢🟢			
	Limits	**DJI VISION App**	**Rear LED flight indicator**
Max Height	Flight height must be under the set height.	Warning: Height limit reached.	None.
Max Radius	Flight distance must be within the max radius.	Warning: Distance limit reached.	Rapid red flashing 🔴🔴🔴🔴🔴🔴 when close to the max radius limit.

Ready to Fly(non-GPS) ⬤⬤⬤⬤⬤			
	Flight Limits	**DJI VISION App**	**Rear LED flight indicator**
Max Height	Flight height restricted to 120m and under.	Warning: Height limit reached.	None.
Max Radius	No limits		

⚠️

(1) If you fly out of the limit, you can still control the Phantom, but cannot fly it further.

(2) If the Phantom flies out of the max radius in Ready to Fly (non-GPS) mode, it will fly back within

range automatically.

6.2 Flight Limits of Special Areas

Special areas include airports worldwide. All special areas are listed on the DJI official website. Please refer to

http://www.dji.com/fly-safe/category-mc for details. These areas have been divided into category A and category B.
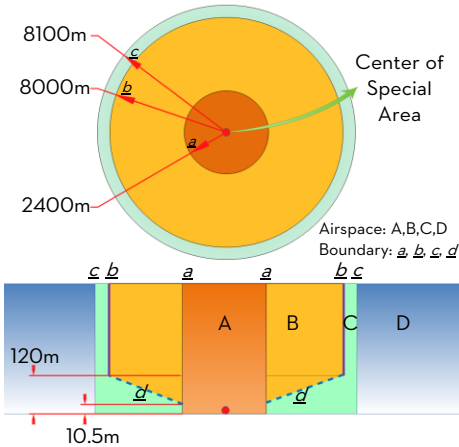
Figure 59: Category A
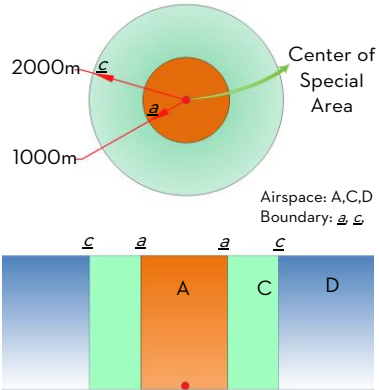
Figure 60: Category B

Ready to Fly mode ⬤⬤⬤⬤⬤			
Airspace	**Limits**	**DJI VISION App**	**Rear LED Flight Indicator**
A Orange	Motors will not start.	Warning: You are in a restricted zone. Take off prohibited	⬤⬤⬤⬤⬤
	If the Phantom flies into a special area in Ready to Fly (non-GPS) mode and Ready to Fly mode activates, it will automatically descend and land then stop its motors.	Warning: You are in a restricted zone. Now descending.	
B	If the Phantom flies into a special area in	Warning: You Are In A Restricted Zone,	

Yellow	Ready to Fly (non-GPS) mode and Ready to Fly mode activates, it will descend to airspace C and hover 5 meters below edge _d_.	Now Descending.	
C **Green**	No restrictions of flight, but the Phantom will not enter Category A, the aircraft can fly free, but it will not enter Airspace B through Boundary _b & d_. Around Category B sites, the phantom can fly freely, but it will not enter into Airspace A through Boundary _a_.	Warning: You are close to a restricted zone, Fly Cautiously. (Note: For airspace A, when aircraft enters the area beneath the Boundary d, the warning message changes to "You are in a restricted area. Max flight height restricted to between 10.5m and 120m. Fly Cautiously.")	
D **Blue**	No restrictions.	None.	None.

🔍 **Semi-automatic descent**: All stick commands are available except the throttle stick command during the descent and landing process. Motors will stop automatically after landing. Users must toggle the S1 switch to regain control. This is the same as regaining control during Failsafe. Please refer to Regaining Control During Failsafe Procedure (Page42).

⚠️ (1) When flying in the airspace (A/B/C) of restricted special area, LED flight indicators will blink red 🔴🔴🔴🔴🔴🔴 quickly and continue for 3 seconds, then switch to indicate current flying status and continue for 5 seconds at which point it will switch back to red blinking.
(2) For safety reasons, please do not fly close to airports, highways, railway stations, railway lines, city centers and other special areas. Try to ensure the aircraft is visible.

6.3 Conditions of Flight Limits

In different working modes and flight modes, flight limits will differ according to number of GPS satellites found. The following table demonstrates all the cases(√: available; ×:unavailable).

All flights are restricted by height, distance and special areas simultaneously. The Failsafe and Ground Station operations are not restricted to flight limits, but if Ground Station function is used, the flight will be restricted the special area limits built in to Ground Station. Refer to the Ground Station manual for details.

Phantom mode			
Flight Status	**Limits of Special Area**	**Max Height**	**Max Radius**
Ready to Fly	√	√	√
Ready to Fly (non-GPS)	×	√	×

Naza-M mode				
Control Mode	number of GPS found	Limits of Special Area	Max Height	Max Radius
GPS	≥6	√	√	√
	< 6	×	√	×
ATTI.	≥6	√	√	×
	< 6	×	√	×
Manual	≥6	×	×	×
	< 6	×	×	×

6.4 Disclaimer

Please ensure that you are up to date with international and domestic airspace rules and regulations before using this product. By using this product, you hereby agree to this disclaimer and signify that you have read this fully. You agree that you are responsible for your own conduct and content while using this product, and for any direct or indirect consequences caused by not following this manual, violating or disregarding other applicable local laws, administrative rules and social habits thereof.

DJI VISION App Usage

The DJI VISION App controls the Phantom 2 Vision+ camera including capture, recording, settings and pitch angle.

It also displays essential flight information including flight parameters and battery level.

1 DJI VISION App Main Menu

After logging in you will see the VISION App home screen. This shows current Wi-Fi connection status and the four

main features of the App.
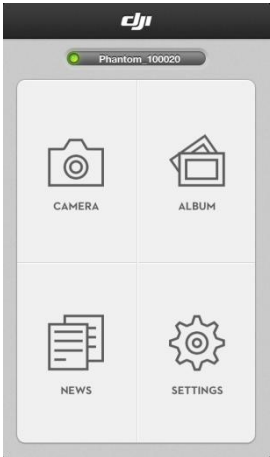
Figure 61

Icons		Description
	Camera	Tap to enter camera preview
	Album	Tap to enter album
	News	Tap to enter DJI news
	Settings	Tap to enter App settings

⚠	(1)	When using the camera and the <u>SD card album (Page 57)</u>, connect your mobile device to the Phantom 2 Vision+ Wi-Fi network.
	(2)	Internet access is required for sharing photos, videos and reading DJI news.
	(3)	If you receive a phone call during a flight, the live camera preview screen may be interrupted. It's recommended to ignore the call and pay attention to your flight.

2 Camera Page

[1]
[2]
[3]
[4]
[5]
[6]
[7]
[8]
[9]
[10]
[11]
[12]
[13]
[14]

Distance: 110.8ft Altitude: 117.7ft Speed: 0.0mph

Figure 62

[1]Return [2] Camera Pitch Control [3] Flight Attitude and Radar Function [4] Flight Parameters [5] Wi-Fi Signal Intensity [6] Flight Battery Level [7] Aircraft GPS Status [8] Micro-SD Card Status [9] Range Extender Battery Level [10] Remaining Shots [11] Shutter Button [12] Video Recording Button [13] Camera Settings [14] Hide or Show Flight Parameters

[1] Return

- Return to the preview page

[2] Camera Pitch Control

- Pitch Control switch is white   tap once to highlight it   and enter Accelerometer Sensor Mode. Tap again to return to normal.

Normal Mode

Tap up arrow   to pitch camera upwards and down arrow   to pitch downwards. Green slider   indicates current camera pitch.

Gimbal pitch control (Normal Mode)	Gimbal pitch movement
 Distance: 111.4ft Altitude: 118.2ft Speed: 0.0mph **Figure 63**	 **Figure 64**

Accelerometer Sensor Mode

The gimbal pitch movement is controlled by moving your mobile device. Pitch forward to pitch camera down and backward to pitch camera up.

Gimbal pitch control (Accelerometer Sensor Mode)	
Figure 65	**Figure 66**
Gimbal pitch movement	
Figure 67	
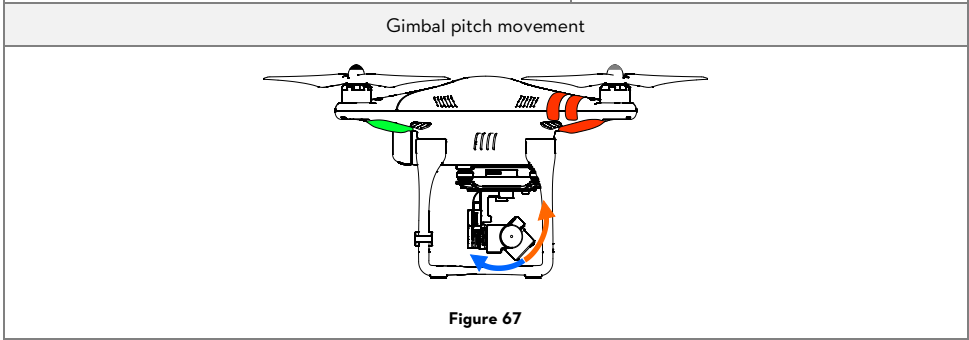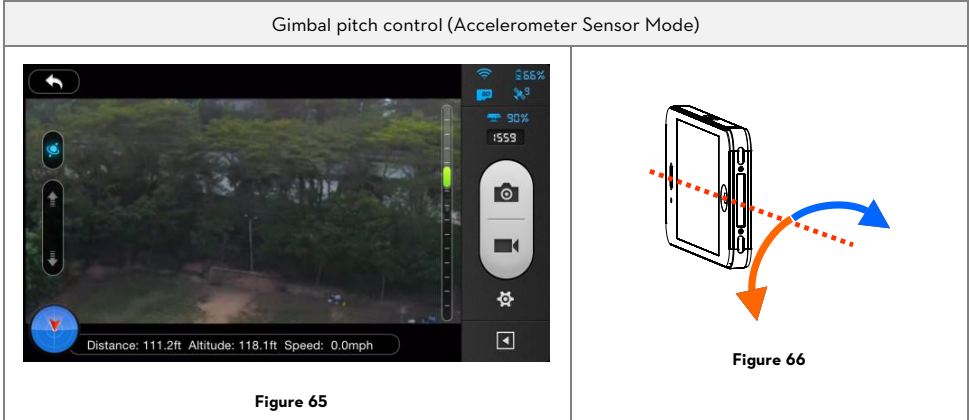
⚠️ In Accelerometer Sensor Mode, the pitch angle indicator will show a grey area. When the green pitch indicator is inside the grey area, the camera will move according to pitch gestures. When the indicator reaches the boundary of the grey area, pitch gestures will control the camera´s pitch speed at a constant rate.

[3] Flight Attitude and Radar Function

Flight attitude is indicated by the flight attitude icon.

(1)   The red arrow shows which direction the Phantom 2 Vision+ is facing.

(2)   Light blue and dark blue areas indicate pitch.

(3)   Pitching of the boundary between light blue and dark blue area shows roll angle.

Figure 68

Tap flight attitude icon to turn on the radar function. Home in the center of the radar and the red icon indicates the Phantom 2 Vision+'s current heading, direction, and approximate distance from home. Tap flight attitude icon again to disable the radar.

Home Point

Figure 69

Aircraft Position

Mobile Device Position

Distance
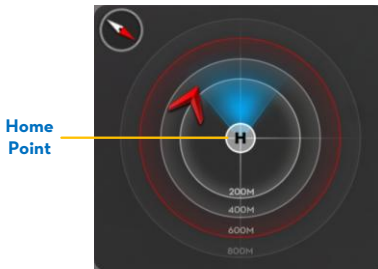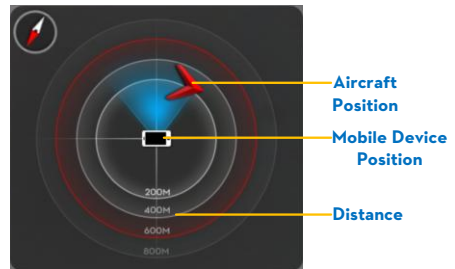
Figure 70

(1) By default, the center of the radar indicates the home point recorded by the Phantom 2 Vision+. Tap the center of the radar to switch the center to your mobile device's current location.

(2) If your mobile device contains a compass, the top portion of the Radar is the direction you are pointing. If not, the radar will be oriented due north.

(3) Distance units are metric in Figure 69 and Figure 70. Users can switch the unit to imperial in the settings page.

[4] Flight Parameters

Distance: Horizontal distance from home point.

Altitude: Vertical distance from home point.

Speed: Horizontal flying speed.

Distance value will show as N/A if the Phantom 2 Vision+ is not in "Ready to Fly" mode.

[5] Wi-Fi Signal Intensity

Indicates camera is connected to your mobile device and Wi-Fi is working normally.

The connection between the camera and mobile device may fail if Wi-Fi signal strength is low. Refer to < Phantom 2 Vision+ CONNECTION BROKEN> for more information.

[6] Flight Battery Level

Show current flight battery level. When battery level is low and the battery icon turns red it is recommended to fly

the aircraft back and land it as soon as possible. Please refer to <u>Low Battery Level Warning Function (Page 43)</u> to get more details.

[7] Aircraft GPS Status

GPS status icon display the number of satellites found by the aircraft. The icon is highlighted when more than 6 satellites are found, allow the Phantom to fly in "Ready to Fly" mode.

[8] Micro-SD Card Status

Displays Micro-SD Card Status. Icon is highlighted when a valid Micro-SD card is inserted. If there is no Micro-SD card present, it is grayed out.

[9] Range Extender Battery Level

Shows current battery level of the Range Extender. Refer to <u>Checking the Battery Level (Page 30)</u> for more details.

[10] Remaining Shots

Displays estimated shots remaining, based on the current photo size setting and storage capacity of the Micro-SD card. This shows `0´ if: (1) Micro-SD card is not inserted. (2) Micro-SD card is full. (3) Micro-SD card is damaged. (4) Connection between the DJI VISION App and camera is broken.

[11] Shutter Button

Tap to take photos.

Single capture: press once for a single capture.

Continuous capture: press once for 3 or 5 captures.

Timed capture: press once to begin a timed capture, press again to stop.

💡	(1) Shutter button is disabled during video recording.
	(2) Capture modes can be reconfigured in camera settings; refer to the <u>Camera Settings (Page53).</u>

[12] Video Recording Button

Start and stop video recording. Tap once to start recording. A red dot will blink to indicate recording is in progress and a time code will appear in the top right corner of the preview screen. Press again to stop recording.

Figure 71

[13] Camera Settings

Tap to open the camera settings menu, refer to <u>Camera Settings (Page 53)</u>.

[14] Hide or Show Flight Parameters.

Tap to hide flight parameters. Tap again to show.
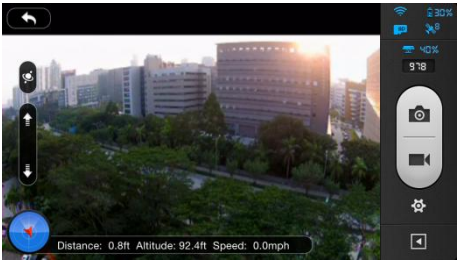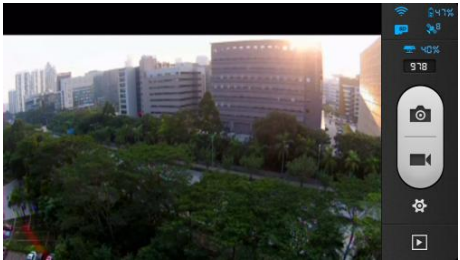
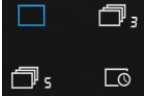**Figure 72**   **Figure 73**

3 Camera Settings
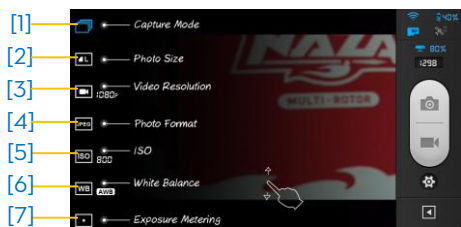
<div align="center">**Figure 74**   **Figure 75**</div>

[1] Capture Mode [2] Photo Size [3] Video Resolution [4] Photo Format [5]ISO [6] White Balance [7] Exposure Metering [8] Exposure Compensation [9] Sharpness [10] Anti-flicker [11] Restore Default Settings [12] Format Micro-SD Card

[1] Capture Mode

	Single capture.
	3 captures.
	5 captures.
	Configurable timed capture: a) Interval between shots (3~60 s) b) Number of shots (2~254, or number of picture is subject to the capacity of the memory card.)

> 💡 Capture Button will change according to the mode selected , , , .

[2] Photo Size

	Large: 4384 x 3288, 4:3, 14.4MP
	Medium: 4384 x 2922, 3:2, 12.8MP
	Small: 4384 x 2466, 16:9, 10.8MP

[3] Video Resolution

	1920 x 1080 60i,	16:9
	1920 x 1080 30p,	16:9
	1920 x 1080 25p,	16:9
	1280 x 720 60p,	16:9
	1280 x 720 30p,	16:9
	640 x 480 30p,	4:3(VGA)

> 💡 Three Field of View (FOV) options are supported when shooting in 1920x1080 60i, 1920x1080 30p and 1920x1080 25p: Medium (110˚) and Narrow (85˚).
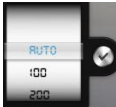
[4] Photo Format

	JPEG JPEG
	RAW RAW
	The Phantom 2 Vision+ camera shoots in JPEG and RAW file formats simultaneously when this option is selected. See the following table for detailed specifications.

JPEG photo size	4384 X 3288	4384 X 2922	4384 X 2466
RAW photo size	4384 X 3288	4384 X 2920	4384 X 2464

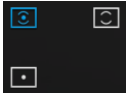> 💡 RAW can be edited using the most recent versions of Adobe Camera Raw for Photoshop and Adobe Lightroom.

[5] Selectable ISO

	AUTO
	100
	200
	400

[6] White Balance

	AWB (auto white balance)
	Sunny
	Cloudy
	Incandescent lamp

[7] Exposure Metering

	Center
	Average
	Spot

> 🔍 **Center:** The meter concentrates most on the center of the scene.
>
> **Average:** Averages out the light levels for the entire image. This mode is used when the scene has no significant light difference.
>
> **Spot:** Measures a small area in the center of the scene. This mode is used in a high contrast scene where the subject must be accurately exposed.
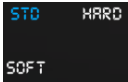
[8] Exposure Compensation

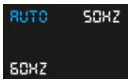|	-2.0(EV)	2.0(EV)
	-1.7(EV)	1.7(EV)
	-1.3(EV)	1.3(EV)

	-1.0(EV)	1.0(EV)
	-0.7(EV)	0.7(EV)
	-0.3(EV)	0.3(EV)
	0(EV)	

[9] Sharpness

	Standard
	Hard
	Soft

[10] Anti-flicker

|	Auto
	50Hz
	60Hz

[11] Restore Default Settings

Restores all default camera settings. Flight battery restart is needed to allow restoration to take effect.

[12] Format Micro-SD Card

Format the Micro-SD card. All data stored in the Micro-SD card will be lost after formatting. Remember to backup before formatting.

4 Album Page

The DJI VISION App has an SD Card album and a Mobile Device album. Images and videos on the SD Card album can be synchronized to the Mobile Device album.

In the DJI VISION App, tap ![icon] to enter into the SD Card album and tap ![icon] to enter into Mobile Device album.

SD CARD Album ——————

—————— Mobile Device Album
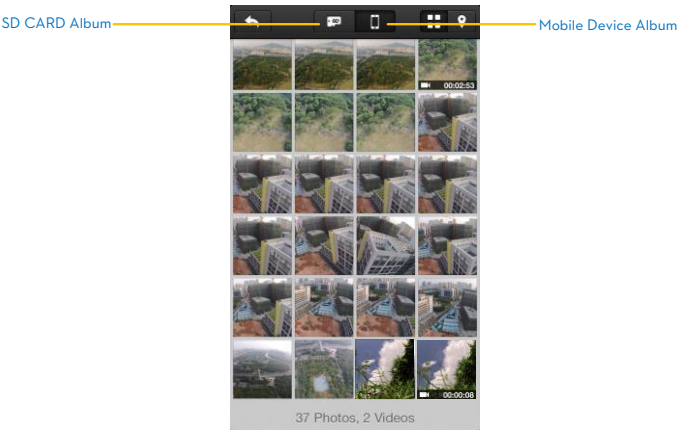
Figure 76

⚠	SD CARD album is accessible when the mobile device is connected to Phantom 2 Vision+ Wi-Fi.

4.1 SD Card Album

Pictures stored in the camera are presented using thumbnails. Tap the corresponding thumbnail to view the picture.
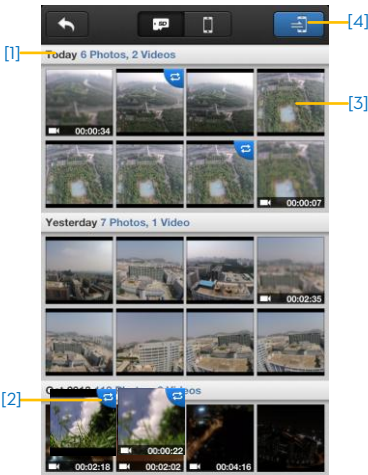
Figure 77

[1] Photos and videos are listed and grouped by date.

[2] All photos and videos that have been synced to your mobile device are marked with ![icon].

[3] Tap any thumbnail for single view mode. Tap a Photo thumbnail that hasn´t been synchronized to the mobile

device to view the photo. Swipe left or right to view the previous or next photo. Tap on a video thumbnail to play it and view the video length. A progress bar will appear at the bottom of the screen. Tap to enter single synchronization mode to synchronize a single photo or video, or to synchronize and play a video at the same time.
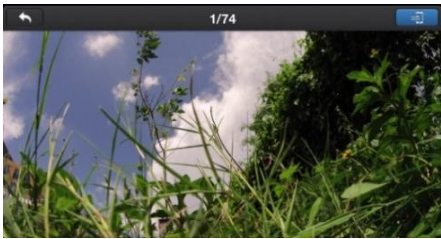

| Figure 78 | Figure 79 |

[4] Tap the button to enter multiple synchronization mode (as shown in the following diagram). Tap thumbnails to select photos or videos to synchronize to your mobile device (selected thumbnails are marked with a tick). Select one or more groups to be synchronized by checking the box before the group, then tap to start synchronizing. During the synchronization process, users can tap to cancel synchronization. Photos and videos that have been synchronized to the mobile device will remain.

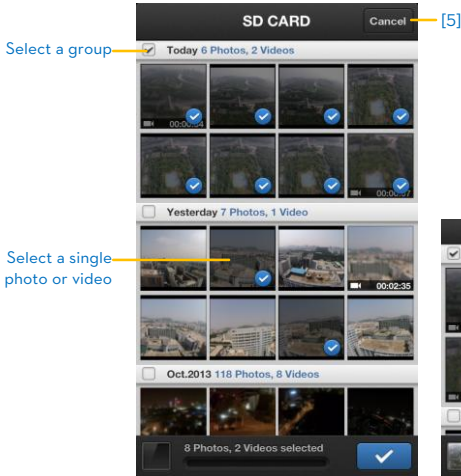> ⚠️ Some mobile devices cannot support the synchronization of 1080i60 video files.
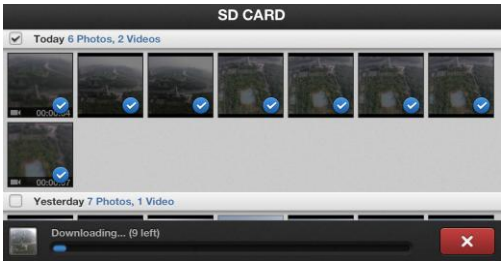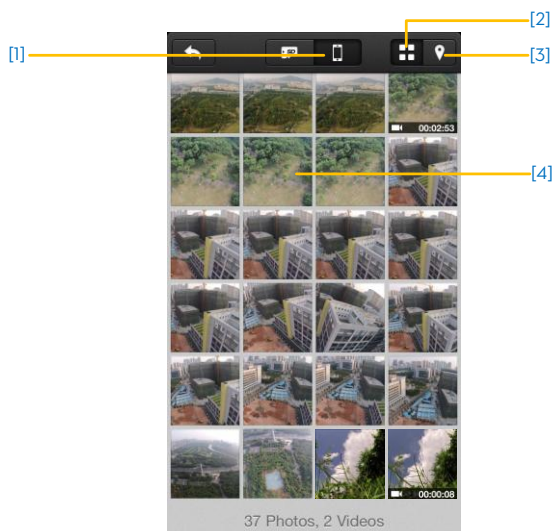

| Figure 80 | Figure 81 |

[5] Tap "Cancel" or "Finished" to exit multiple synchronization mode and return to the SD Card page.

> 💡 Connect camera data port to a PC via a Micro-USB cable to copy photos or videos on the SD card album from the Micro-SD card to the PC conveniently.

4.2 Mobile Device Album

Figure 82

[1] Browse all synchronized photos and videos in the album. Tap to view selected photos or videos.

[2] Photos and videos are displayed using thumbnails and sorted by capture time.

[3] Pictures and videos are sorted by captured/recorded geo-tagged locations.

⚠	Internet access is required for map downloads.

Figure 83

[4] Tap any thumbnail for single view; you can slide left or right to view the previous or next photo. Tap a video thumbnail to play a single video.
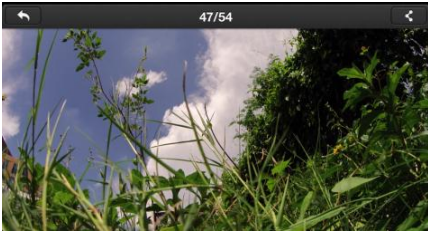
[5]

Figure 84	Figure 85

[5] Tap to share your photos and videos to social networks.

⚠️ Access to the Internet is required for photo and video sharing.

SHARE YOUR AERIAL MASTERPIECES
Download pictures and videos directly to your mobile
devices and share them instantly online

Figure 86

5 News Page

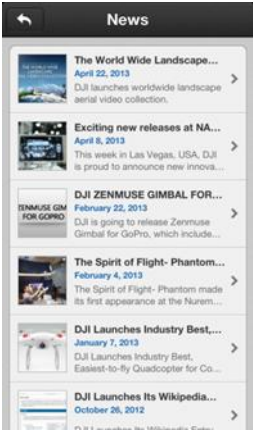View the latest DJI news. (Internet access is required.)

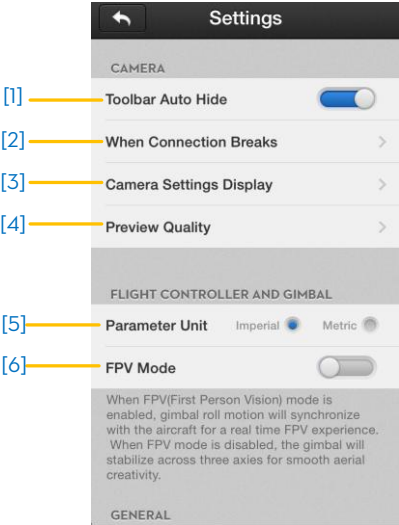Figure 87   Figure 88

6 Settings Page
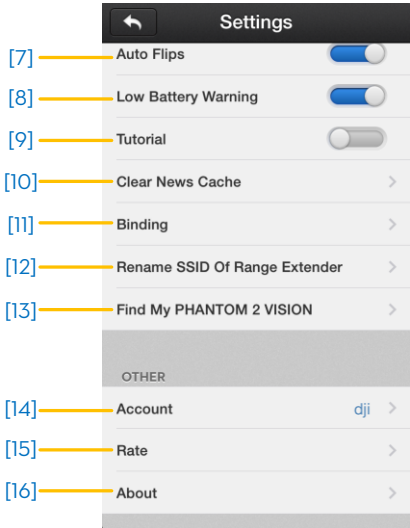

Figure 89

Figure 90

[1] Toolbar Auto Hide

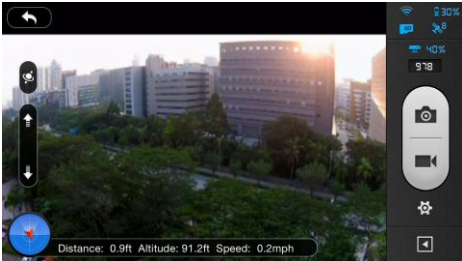Slide the switch from left to right to enable this function. Toolbar will auto hide on the camera page.

Figure 91: Toolbar Auto Hide Enabled

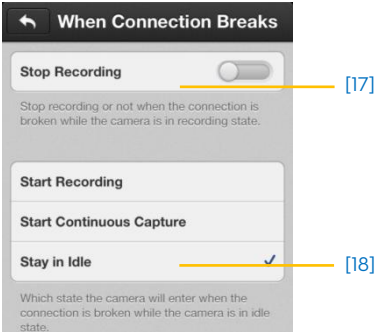**Figure 92: Toolbar Auto Hide Disabled**

[2] When Connection Lost

Figure 93

[17] Stop Recording:

Enabled: Stop recording if the Wi-Fi connection between the mobile device and the camera breaks while the camera is recording.

Disabled: Keeps recording if the Wi-Fi connection between the mobile device and the camera breaks while the camera is recording.

[18] Select the state the camera will enter in the event of a Wi-Fi Connection break between the mobile device and the camera. Use this function to ensure you can continue don´t miss out on a shot.

[3] Camera Settings Display

iOS users will see an enabled item display in the camera settings toolbar and disabled items will be hidden.

This feature is not available on Android.

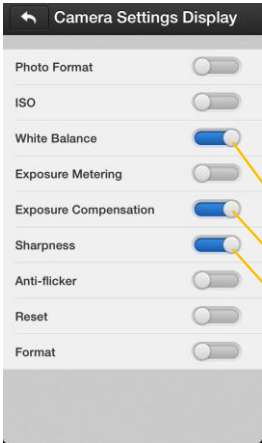**3 items displayed by default**

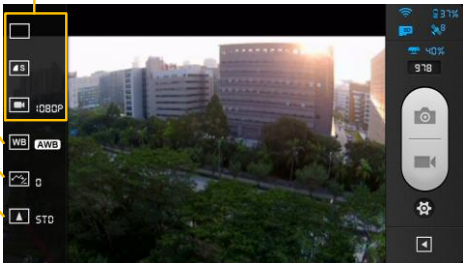|	
Figure 94	Figure 95

[4] Preview Quality

Figure 96

High: 640 x 480@30fps

Medium: 640 x 480@15fps

Medium: 320 x 240@30fps

Low: 320 x 240@15fps (Recommended when there is a lot of interference.)

[5] Parameter Unit

Select imperial or metric units of measurement.

[6] FPV Mode

Switched on, the gimbal will work in FPV mode. Switched off, the gimbal will work in Stabilize mode.

[7] Auto Flips

The user interface of the DJI VISION App will flip if the mobile device's auto-flip is enabled.

[8] Battery Low Warning

If enabled, an alarm will sound when the battery level is too low.

⚠️   We recommended adjusting the mobile device volume to the highest level.

[9] Tutorial

Hints and Tips

[10] Clear News Cache

Tap to flush news cache.

[11] Binding

In the event that camera and Range Extender binding is lost or an item has been repaired or replaced, binding must be performed using the DJI VISION App. Refer to for details.

[12] Rename SSID of Range Extender

Tap to rename the SSID of the Range Extender. Refer to for details.

[13] Find My PHANTOM 2 VISION

My location

PHANTOM 2
VISION'S location

My location

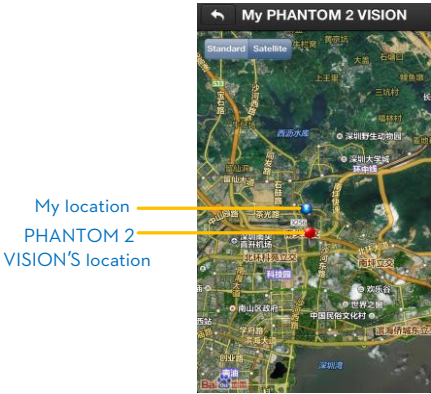PHANTOM 2
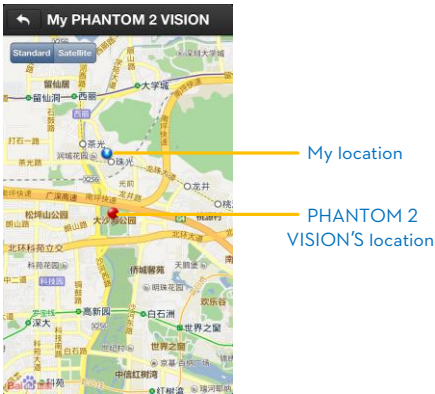VISION'S location

Figure 97   **Figure 98**

[14] Account

Tap to see user account information.

[15] Rate

Tap to rate the DJI VISION App. Internet access required.

Android App does not include rating.

[16] About

Tap to see the current version of the DJI VISION App and contact information.

Assistant Software

For better use of the Phantom 2 Vision+, Phantom 2 Vision+ Assistant Software and PHANTOM RC Assistant Software are required. Both run on Windows or Mac OS X operating systems.

1 Installing Driver and Phantom 2 Vision+ Assistant Software

1.1 Installing and Running on Windows

1. Download the driver installer and Assistant Software installer (.EXE) from the Phantom 2 Vision+ download page.
2. Connect the Phantom 2 Vision+ to a PC using a Micro-USB cable.
3. Run the driver installer and follow the prompts to finish installation.
4. Run the Assistant Software installer and follow the prompts to finish installation.
5. Double click the Phantom 2 Vision+ icon on your desktop to launch Assistant Software.

⚠️　Supports Windows XP, Windows 7 and Windows 8 (32 or 64 bit).

1.2 Installing and Running on Mac OS X

1. Download the Assistant Software installer (.DMG) format from the Phantom 2 Vision+ download page.
2. Run the installer and follow the prompts to finish installation.

Figure 99

3. When launching for the first time, if using Launchpad to run the Phantom 2 Vision+ Assistant Software, Launchpad will not allow access because Assistant has not been reviewed by the Mac App Store.

Figure 100

4. Locate the Phantom 2 Vision+ icon in Finder, press Control then click the icon (or right-click the icon using a mouse). Choose Open from the shortcut menu, then click Open in the prompt dialog box to launch.

5. After the first successful launch, double click the Phantom 2 Vision+ icon as normal to launch using Finder or Launchpad.

Figure 101

| ⚠ | .DMG installer supports Mac OS X 10.6 or above. |

| 💡 | Phantom 2 Vision+ Assistant Software on Mac OS X and Windows are the same. Assistant Software pages shown in this manual are from the Windows version. |

2 Using Assistant Software

The Phantom 2 Vision+ Assistant Software is used to configure the flight control system and upgrade firmware. The PHANTOM RC Assistant Software is used to configure the Remote Controller and upgrade its firmware.
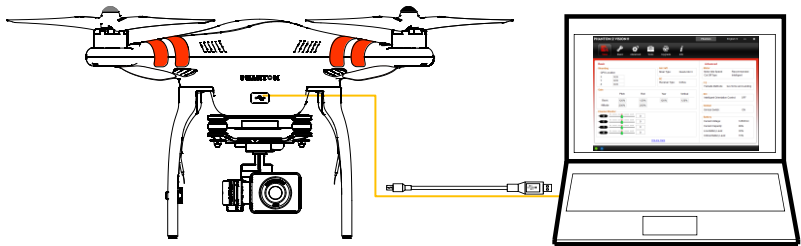
2.1 Using the Phantom 2 Vision+ Assistant Software

Figure 102

1. Power on the PC and the Phantom 2 Vision+. Connect the Phantom 2 Vision+ to the PC with a Micro-USB cable. DO NOT disconnect until configuration is finished.

2. Run Phantom 2 Vision+ Assistant Software and wait for the Phantom 2 Vision+ to connect. Watch the indicators on the bottom of the screen. When connected successfully, the connection indicator is and communication indicator is blinks .

3. Choose [Basic] or [Advanced] configuration pages.

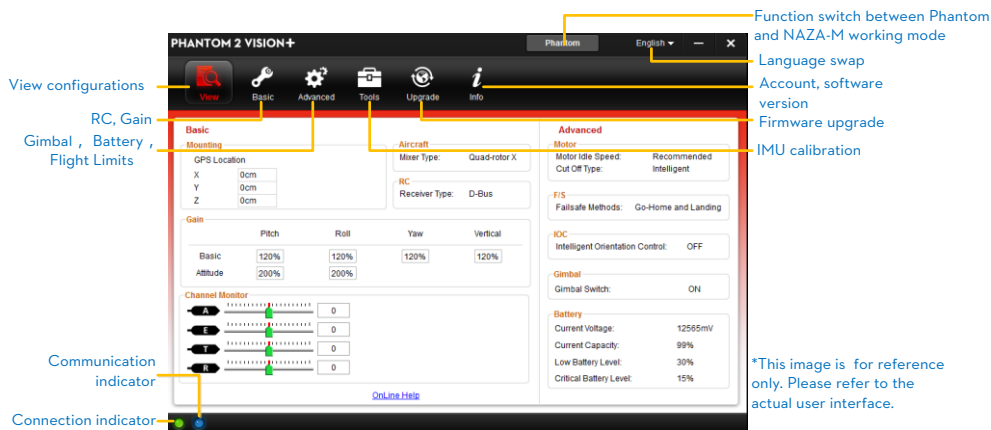4. View and check the current configuration in the [View] page.

Figure 103

⚠️ (1) Do not enable Naza-M mode before finishing "Advanced Flight Maneuvers" in the "Phantom Pilot Training Guide".

(2) Enable Phantom mode by tapping the same button if Naza-M mode is enabled. Once changed to Phantom working mode, all parameters will return to factory settings.

2.2 Firmware Upgrade of the Phantom 2 Vision+

1. Click [Upgrade] icon to check the current firmware version and whether the installed firmware is the latest version. If not, click links to upgrade.
2. Wait until the Assistant Software shows "finished". Click OK and power cycle the Phantom 2 Vision+ after 5 seconds. Once complete, firmware is up to date.
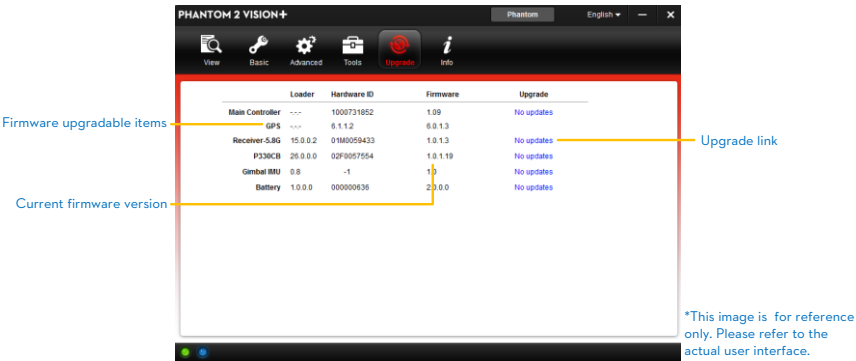

Figure 104

(1) An internet connection is required to upgrade the Phantom 2 Vision+ firmware.

(2) DO NOT power off until the upgrade is finished.

(3) If the firmware upgrade fails, the main controller will enter a waiting for firmware upgrade status automatically. If this happens, repeat the above procedures.

Firmware upgradable items: (1)Main Controller (2)GPS (3)5.8G Receiver (4) Main Board (P330CB) (5)Battery (6)Gimbal IMU

2.3 Using the PHANTOM RC Assistant Software

Use the Phantom 2 Vision+ Assistant Software to install PHANTOM RC Assistant Software on your Windows PC or Mac, and then follow the below steps to configure the Remote Controller.
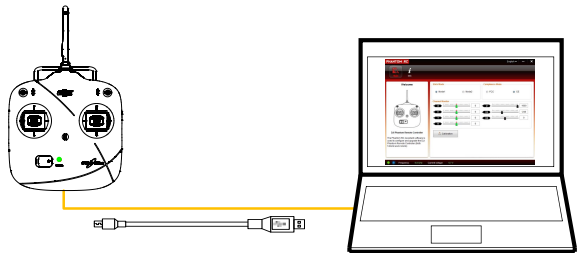

Figure 105

1. Turn off the Remote Controller and find its Micro-USB port.
2. Power on PC and Remote Controller then connect Remote Controller to the PC with a Micro-USB cable.

DO NOT disconnect until configuration is finished.

3. Run the PHANTOM RC Assistant Software and wait for the Remote Controller to connect to Assistant Software. Watch the indicators ⬤⬤ on the bottom left of the screen. When connected successfully, the connection indicator is 🟢 and communication indicator blinks 🔵 .

4. Finish configuration in the [Main] page.

5. Finish upgrade in the [Info] page if necessary.

Language swap

Main page

Firmware upgrade
Account, software
version

Communication indicator

Connection indicator

*This image is for
reference only. Please
refer to the actual
user interface.

Figure 106

Appendix

1 Rear LED Flight Indicator Status

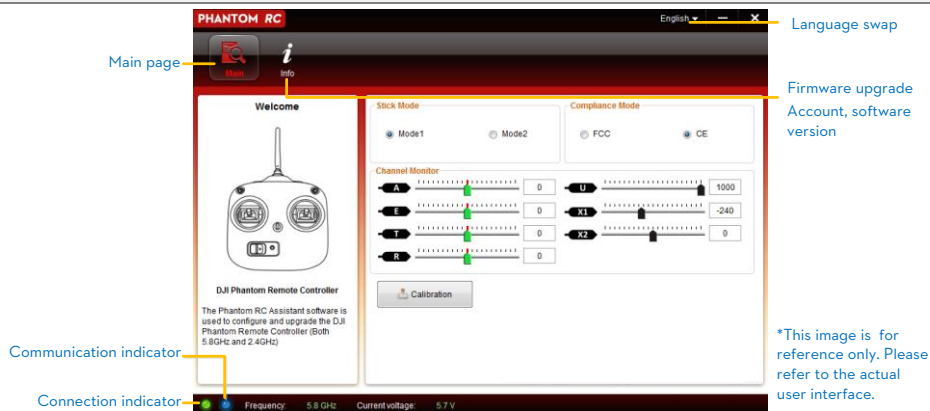| Rear LED Flight Indicators	Normal status
●●●●● (Red, Green, Yellow flashes in turn)	Power On Self-Test
●●●●● (Green, Yellow flashes in turn)	Warming Up
●●●●● (Slow Green flashes)	Ready to Fly
●●●●● (Slow Yellow flashes)	Ready to Fly (non-GPS)
Rear LED Flight Indicators	**Abnormal status**
●●●●●● (Quick Yellow flashes)	Remote Controller Signal Lost
●●●●● (Slow Red flashes)	Low Battery Level Warning
●●●●●● (Quick Red flashes)	Critical Low Battery Level Warning
●●● (Three Red flashes off and on)	Not Stationary or Sensor Bias is too big
▬▬▬ (Solid red)	Error*
●●●●● (Red, Yellow flashes in turn)	Compass Needs Calibration

*You can investigate the error by connecting the Phantom 2 Vision+ to the Phantom 2 Vision+´s Assistant Software.

2 Specifications

Aircraft	
Supported Battery	DJI 5200mAh Li-Po Battery
Weight (Battery & Propellers included)	1242g 2.74 lbs
Hovering 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: 3m/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℃-40℃
Sensor Size	1/2.3"
Effective Pixels	14 Megapixels
Resolution	4384×3288
HD Recording	1080p30 /1080i60
Recording FOV	110° / 85°

Remote Controller	
Operating Frequency	5.728 GHz - 5.85 GHz
Communication Distance (open area)	CE Compliance: 400m; FCC Compliance: 800m
Receiver Sensitivity (1%PER)	-93dBm
Transmitting Power (EIRP)	CE Compliance: 25mW; FCC Compliance: 100mW
Working Current/Voltage	80 mA@6V
Battery	4 AA Batteries

Range Extender	
Operating Frequency	2412MHz - 2462MHz
Communication Distance (open area)	500m - 700m
Transmitting Power	20dBm
Power Consumption	2W

3 Troubleshooting (FAQ)

3.1 How to solve large margin(s) mid-point error?

If the Remote Controller stick(s) mid-point margin of error is too big, the motors will fail to start when you execute the CSC and the Phantom will not take off. The below are some possible fixes for this.

(1) One of the Remote Controller´s stick positions (except the throttle stick) is not centered when powering on the Phantom 2 Vision+.

Solution: Place all Remote Controller sticks at their mid-point positions and then power cycle the Phantom 2 Vision+ to re-record the mid-point.

(2) The Remote Control sticks have been trimmed, leading to a deviation in the mid-point position.

Solution: Use Assistant to perform a Remote Control calibration.

    (1) Connect to Assistant Software, tap Basic -> RC -> Command Sticks Calibration and push all Remote Control sticks through their complete travel range to see if any stick cannot reach its outermost position.

    (b) Power cycle the Phantom 2 Vision+. Power cycling is required.

    (c) Re-attempt Remote Controller calibration in Assistant.

If the above solutions do not solve your issue, please send your Remote Control to DJI Customer service for repair.

3.2 How to restore a video file if power is turned off during a recording session?

Solution: Keep or place the Micro-SD card back into the camera. Power cycle the camera and wait about 30 seconds for the video file to be restored.

3.3 Failure to acquire the SSID.

Solution: Double check whether both the camera and Range Extender are powered on and the power switch of the camera is switched to "Wi-Fi ON."

3.4 What to do if Phantom 2 Vision+ is out of sight and the Wi-Fi connections is lost?

Solution: Turn off the Remote Controller to trigger the Failsafe mode and the aircraft will start to fly back, descend, and land at the Home point. Please make sure there are no obstacles between the Phantom and the home point and that you are familiar with the procedure for regaining control.

3.5 Wi-Fi connection fails all the time.

Solution: Double check the current Wi-Fi connection status of the mobile device. The mobile device may be connecting to other Wi-Fi networks after a connection breaks with the Phantom 2 Vision+.

3.6 Files fail to synchronize.

Solution: Video files that are too large (file sizes close to 4GB) cannot be synchronized to the mobile device. Some mobile devices do not support the synchronization of the 1080i60 video files.

3.7 iOS Albums fail to synchronize.

Solution: Reset the settings of your mobile device as illustrated below. Enable the Settings -> Private -> Photos -> DJI VISION. Otherwise Albums will fail to synchronize with your mobile device.

Settings

Airplane Mode — OFF
WLAN — Phantom_100cd9
Bluetooth — On
Do Not Disturb — OFF
Notifications
General
Sounds
Brightness & Wallpaper
Privacy
iCloud

Privacy (Settings)

Location Services — On
Contacts
Calendars
Reminders
Photos
Bluetooth Sharing
Twitter
Facebook
Sina Weibo

Photos (Privacy)

Photos stored on your iPod touch may contain other information, such as when and where the photo was taken.

DJI VISION — ON
DJIHand — ON

Apps that have requested access to your photos will appear here.

3.8 Failure to share.

Solution: Make sure your mobile device has access to the Internet.

3.9 Some Android devices have a problem connecting to the Phantom 2 Vision+ Wi-Fi Extender.

Solution: Some Android devices do not allow for both a Wi-Fi connection and a mobile data connection at the same time. When trying to connect to the Phantom 2 Vision+ Wi-Fi network, most devices will check whether an Internet connection has a certain Wi-Fi setting enabled, e.g. Auto network switch or Test for Internet connection. If no Internet connection is found because the Phantom 2 Vision+ creates a non-routable connection it will drop the Phantom 2 Vision+ Wi-Fi network connection and scan for the next available connection. Example: For the Samsung Note 3, carry out the following procedures to solve this issue. Tap Settings -> Wi-Fi, and then tap the "Menu" button. Select "Advanced" then uncheck the "Auto network switch". You might see a warning that indicates the Internet connection is unstable this message can be ignored.

3.10 App tips for mobile devices.

If using the App on multiple mobile devices turn off the App on the first mobile device then turn it on on the second one to ensure normal functions on the second mobile device.

3.11 How to land the aircraft more smoothly?

First pull the throttle stick position down to lower than 5%, then execute the CSC command to stop the motors.

3.12 Why is the discharge time of a battery not zero when unused?

A battery aging test is performed prior to delivery which affects the discharge time of the new battery. This is why the discharge time of a new battery is not zero. The battery is okay to use.