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

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

August 11, 2015

Exemption No. 12413
Regulatory Docket No. FAA–2015–2189

Mr. Zachary P. Elliott, Esq.
Member and In-House Counsel
513 Aerial, LLC
7021 Cleves Warsaw Pike, Suite 301
Cincinnati, OH 45233

Dear Mr. Elliott:

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

By letter dated May 21, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of 513 Aerial, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial photography and videography for the education of real estate professionals and real estate marketing.

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.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria

provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

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

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

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

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, 513 Aerial, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

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

Conditions and Limitations

In this grant of exemption, 513 Aerial, LLC is hereafter referred to as the operator.

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

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 2 when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

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

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

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

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

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

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

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

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

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

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

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

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

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

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be

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

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

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

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

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

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

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

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

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification

(N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

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

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

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

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

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

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

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

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

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

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

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

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

This exemption terminates on August 31, 2017, unless sooner superseded or rescinded.

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

Enclosures

FAA Exemption Rulemaking – Section 333 of the FAA Reform Act and Part 11

Prepared by:

Zachary P. Elliott, Esq.
May 21, 2015

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

Re: Exemption Request Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from 14 CFR Part 21; 14 CFR Part 36; 14 CFR 45.23(b); 14 CFR 61.113 (a) & (b); 91.7 (a); 91.9 (b) (2); 91.103; 91.105; 91.109; 91.119; 91.121; 91.151 (a); 91.173; 91.203 (a) & (b); 91.207; and 14 CFR Part 91, Subpart E

Dear Mr. Secretary,

The purpose of this letter is to petition the Federal Aviation Administration for an exemption, pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 CFR Part 11. 513 Aerial, LLC ("513 Aerial"), an Ohio Limited Liability Company and operator of small Unmanned Aircraft Systems ("UAS") equipped to conduct aerial photography and videography for the education of real estate professionals and real estate marketing purposes, hereby applies for an exemption from the listed Federal Aviation Regulations ("FARs") to allow commercial operation of its UAS, so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333.

As described more fully below, the requested exemption would permit the operation of small, unmanned and relatively inexpensive UAS under controlled conditions in airspace that is 1) limited 2) predetermined and 3) controlled as to access. Approval of this exemption would thereby fulfill the Secretary of Transportation's (the responsibilities to "...establish requirements for the safe operation of such aircraft systems in the national airspace system." Section 333(c) of the FAA Modernization and Reform Act. Additionally, this exemption should be eligible for the summary grant process, as the FAA has already granted many previous exemptions similar to this new request.

Identity of Petitioner and Counsel to the Petitioner:

Petitioner:	513 Aerial, LLC c/o Mark Tepe 7021 Cleves Warsaw Pike, Suite 301 Cincinnati, Ohio 45233
Petitioner's Counsel:	Zachary P. Elliott, Esq. 615-809-5567 zachary.elliott@me.com

This exemption application is expressly submitted to fulfill Congress' goal in passing Section 333 (a) through (c) of the Reform Act. This directs the Secretary of Transportation to consider whether certain unmanned aircraft systems may operate safely in the national airspace system ("NAS") before completion of the rulemaking required under Section 332 of the Reform Act. In making this determination, the Secretary is required to determine which types of UAS do not create a hazard to users of the NAS or the public or pose a threat to national security in light of the following:

- The UAS's size, weight, speed, and operational capability:
- Operation of the UAS in close proximity to airports and populated areas; and
- Operation of the UAS within Visual Line of Sight ("VLOS") of the Pilot and Visual observers. *See* Reform Act §333(a). Lastly, if the Secretary determines that such vehicles "may operate safely in the NAS, the Secretary shall establish requirements for the safe operation of such aircraft in the national airspace system." *Id*. §333(c). The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority by its terms includes exempting civil aircraft, as the term is defined under §40101 of the Act; that includes UAS, from the requirement that all civil aircraft must have a current airworthiness certificate. The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any sections 44702-44716 of this title if the Administrator finds the exemption in the public interest. 49 U.S.C. §44704; 14 CFR §91.203(a)(1).
- 513 Aerial's UAS are small rotorcraft aircraft, specifically a DJI Phantom 2, weighing no more than 55oz including sensor payload. They operate their rotorcraft, under normal conditions at a speed of no more than 20 mph, usually 5-8 mph, and have the capability to hover, and move in the vertical and horizontal plane simultaneously. They will manually operate only in VLOS and will operate only within the operating parameters as described in the User Manual v1.4 attached as Exhibit A to this Petition.
- Adherence to the User Manual will insure that the UAS will "not create a hazard to the national airspace system or the public."
- Given the small size and weight of the UAS involved and the restricted sterile environment within which they will operate, the Petitioner falls within that zone of safety (an equivalent level of safety) in which Congress envisioned that the FAA must, by exemption, allow commercial operations of the UAS to commence immediately. Also due to the size of the UAS and the areas in which the relevant UAS will operate, approval of the application presents no national security issue. Given the clear direction in Section 333 of the Reform Act, the authority contained in the Federal Aviation Act, as amended; the strong equivalent level of safety, surrounding the proposed operations, and significant public benefit, including enhanced safety, reduction in environmental impact, including reduced emissions associated with allowing UAS for educational and marketing operations, (as opposed to full scale aircraft), the granting of the requested exemptions are in the public interest. Accordingly, the Petitioner respectfully requests that the FAA grant the requested exemption without delay.

Granting this Exemption is in the Public Interest

An exemption of the following FAR's for 513 Aerial is in the public interest because the

services 513 will be providing to local real estate owners, brokers, agents and commercial contractors will allow for these parties to provide better and more cost effective services to their clients. If this exemption is not granted, 513 Aerial will be unable to provide such services to the public and this will reduce the number of options everyone has to receive accurate and affordable aerial photographs and video of real estate.

UAS Equivalent Level of Safety & Operating Parameters

The Petitioner proposes that the exemption requested apply to civil aircraft that have the characteristics and that operate with the limitations listed in this Petition. These limitations provide for at least an equivalent or possibly higher level of safety to operations under the current regulator structure because the proposed operations represent a safety enhancement to the already safe filming operations conducted with conventional aircraft. These limitations and condition to which 513 Aerial agrees to be bound when conducting commercial operations under an FAA issued exemption include:

1. 513 Aerial will be operating a DJI Phantom 2.
2. All UAS will weigh less than 5 lbs.
3. Flights will be operated manually within visual line of sight (VLOS) of the Pilot and Visual observer.
4. 513 Aerial will establish a fixed location where the portable ground station of the UAS will be positioned and will post a sign near the ground stations stating "Aerial Photography in Progress – Remain Back 150 feet."
5. Maximum total flight time for each operational flight will be 25 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 25 minute limit.
6. Flights will be operated at an altitude of no more than 400 feet AGL, though typical operations will be conducted within 50 feet of the ground.
7. Minimum two (2) man crew for each UAS operation will consist of the Pilot and Visual observer. The UAS Pilot in Command (PIC) will be an FAA licensed airman with at least a private pilot's certificate and third class medical.
8. The UAS will only operate within the limitations as defined in the User Manual in section 6.1. Additionally, the UAS will only operate under 400ft AGL, and outside a 3 statute mile radius of any airport. The UAS will never enter any MOA or Restricted Airspace, nor shall it violate any TFR as outlined by the FAA.
9. A pre-flight briefing will be conducted in regard to the planned UAS operation prior to each day's flying /recording activities. It will be mandatory that all personnel who will be performing duties as "flight crew" be present for this briefing.
10. The Operator will obtain the consent of all persons involved in the filming and ensure that only consenting persons will be allowed within 100 feet of the flight operation, and this radius may be reduced to 30 feet based upon an equivalent level of safety determination.
11. Pilot, and Visual observer will have been trained in operation of UAS generally and received up-to-date information on the particular UAS to be operated as required.
12. The visual observer and Pilot will at all times be able to communicate by voice or two-way radio.
13. Written permission from the relevant property owners will be obtained.
14. Prior to the start of a flight, the PIC will activate and use the UAS GPS flight safety

procedure and lost-link procedure to ensure that the UAS is returned to a pre-determined home base in the event of a lost signal or compromised communication.

15. The UAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.
16. In the event that any flight would ever occur within the airspace of a specific airport, or controlled airspace, 513 Aerial will obtain the permission of that control tower to operate in that airspace or from the appropriate control authority.
17. In the event that any flight will occur within five (5) miles of an airport, 513 Aerial will ensure that the airport is notified of the estimated flight time, flight duration, elevation of flight, and pertinent information.
18. 513 Aerial will conduct all flights in permissible weather, and during daylight hours.

Regulations from which the exemption is requested:

14 CFR Part 21	Certification procedures for products and parts, Airworthiness Certificates
14 CFR Part 36	Noise standards: Type and airworthiness
14 CFR 45.23 (b)	Display of marks, general
14 CFR 61.113 (a) & (b)	Certification: Pilots, flight instructors, and ground instructors
14 CFR 91.7	Civil aircraft airworthiness
14 CFR 91.9	Civil aircraft flight manual, marking and placard requirements
14 CFR 91.103	Preflight action
14 CFR 91.105	Flight crewmembers at stations
14 CFR 91.109	Flight instruction
14 CFR 91.119	Minimum safe altitudes
14 CFR 91.121	Altimeter settings
14 CFR 91.151	Fuel requirements for flights in VFR conditions
14 CFR 91.173	ATC clearance and flight plan in IFR conditions
14 CFR 91.203	Civil aircraft: Certifications required
14 CFR 91.207	Emergency locator transmitters
14 CFR Part 91, Subpart E	Maintenance Inspections

14 CFR Part 21, Subpart H: Airworthiness Certificates

Part 21 establishes the procedures for issuance of certificates of airworthiness, as mandated by 49 U.S.C. § 44704 and as required by FAR §91.203 (a)(1). Given the size and limited operating area associated with the UAS to be utilized by the Petitioner, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act (49 U.S.C. §44701(f)) and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement capability, and proximity to airports and populated areas of the particular UAS.

The Petitioner requests an exemption from the requirements of this Part because the size, weight, speed, operational capability and proximity to airports in which the Subject UAS pose significantly less of a risk that the risks posed by conventional aircraft. Manned aircraft pose risks to the life and safety of the crew; that is not a consideration with a UAS. Risks to third parties are also minimized given the lightweight and slow speed at which a UAS would operate. Nor are there risks of fuel spillage or fire in the event of an accident. Thus, 513 Aerial requests that the FAA waive the requirement that the Subject UAS, particularly the aircraft portion, require an airworthiness certificate.

The UAS to be operated by 513 Aerial is less than 5 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a limited radius area as set out in the pre-flight briefing / VLOS operations. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the Operator, pursuant to safety requirements, and under the requirements and in compliance with local public safety requirements, to provide security for the area of operation as is now done with conventional aircraft. These safety enhancements, which already apply to civil aircraft operated in connection with video production, provide a greater degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates issued under 14 C.F.R. Part 21, Subpart H. Lastly, application of these same criteria demonstrates that there is no credible threat to national security posed by the UAS, due to its size, speed of operation, location of operation, lack of explosive materials or flammable liquid fuels, and inability to carry a substantial external load.

14 CFR Part 36: Noise Standards

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

14 CFR §45.23 (B): Marking of the Aircraft

The regulation requires:

When marks include only the Roman capital letter “N” and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words “limited,” “restricted”, “light-sport,” “experimental,” or “provisional,” as applicable.

Even though the UAS will have no airworthiness certificate, an exemption may be needed as the UAS will have no entrance to the cabin, cockpit or pilot station on which the word “Experimental” can be placed. Given the size of the UAS, two-inch lettering will be impossible. The word “Experimental” will be placed on the fuselage in compliance with §45.29 (f).

The equivalent level of safety will be provided by having the UAS marked on its fuselage as

required by §45.29 (f) where the Pilot, Visual Observer and others working with the UAS will see the identification of the UAS as "Experimental." The FAA has issued the following exemptions to this regulation to Exemptions Nos. 10700, 8738, 10167, 10167A and 11438.

14 CFR §61.113 (a) & (b): Private Pilot Privileges and Limitations - Pilot in Command (PIC)

Sections 61.113 (a) & (b) limit private pilots to noncommercial operations. Because the UAS 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 aircraft to have a private pilot's license rather than a commercial pilot's license to operate this small UAS. Unlike a conventional aircraft that carries the pilot and passengers, the UAS is remotely controlled with no living thing on board. The area of operation is controlled and restricted, and all flights are planned and coordinated in advance as set forth in the Operating Manual. The level of safety provided by the requirements included in the Operating Manual meets that provided by a single individual holding a commercial pilot's certificate operating a conventional aircraft. The risks associated with commercial operations contemplated by Part 61 when drafted, that allowing operations of the UAS as requested with a private pilot as the PIC exceeds the present level of safety achieved by 14 CFR §61.113 (a) & (b).

The Petitioner requests an exemption that would allow 513 Aerial to operate the UAS for compensation or hire for the reasons articulated in *In re Trudeau,* FAA Exemption No. 11138, and *In re Astraeus,* FAA Exemption No. 11062. 513 Aerial will operate the UAS over property where the owner and/or owner's representative has requested that the operation occur. Furthermore, as a holder of a private pilot certificate, the PIC will be an Airman who meets the knowledge base and skill level for operating an UAS. 513 Aerial thus requests an exemption from the requirement that the PIC of the UAS hold a commercial pilot certificate and anything other than a Third Class Medical certificate.

14 CFR §91.7 (a): Civil Aircraft Airworthiness

The regulation requires that no person may operate a civil aircraft unless it is in airworthy condition. As there will be no airworthiness certificate issued for the aircraft, should this exemption be granted, no FAA regulatory standard will exist for determining airworthiness. Given the size of the aircraft and the requirements contained in the Operating Manual for maintenance and use of safety checks prior to each flight, as set forth in the Operating Manual, an equivalent level of safety will be provided.

To the extent that "airworthy" is defined as requiring an airworthiness certificate, the Petitioner would request an exemption from this FAR for the same reasons identified in its request for an exemption of 14 CFR Part 21, Subpart H. 513 Aerial and the PIC will not, however, operate the Subject UAS if it is not in a condition for safe flight, as required under FAR 91.7(b).

14 CFR §91.9 (b) (2): Civil Aircraft Flight Manual in the

Aircraft

Section 91.9 (b) (2) provides: No person may operate a U.S.-registered civil aircraft—

> (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.

The UAS, given its size and configuration has no ability or place to carry such a flight manual on the aircraft, not only because there is no pilot on board, but because there is no room or capacity to carry such an item on the aircraft.

The equivalent level of safety will be maintained by keeping the Operating Manual at the ground control point where the pilot flying the UAS will have immediate access to it. The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A 10602, 32827, 10700 and 11434.

Petitioner requests exemption from the requirement of FAR 91.9, for the same reasons as stated in its request for exemption under 14 CFR Part 21, Subpart H, and for a deviation from the marking requirements of 14 CFR Part 36, Subparts A, F, and O.

14 CFR §91.103: Preflight Action

This regulation requires each pilot in command to take certain actions before flight to insure the safety of flight. As FAA approved rotorcraft flight manuals will not be provided for the aircraft an exemption will be needed. An equivalent level of safety will be provided as set forth in the Operating Manual. The PIC will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight but requests an exemption from this requirement insofar as it is interpreted as requiring pre-flight actions appropriate to manned aircraft only (e.g., that flights be from an airport, etc.).

14 CFR § 91.105: Flight crewmembers at stations

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

14 CFR §91.109: Flight Instruction

Section 91.109 provides that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. UAS and remotely piloted aircraft, by their design do not have fully functional dual controls. Flight control is accomplished through the use of a control box that communicates with the

aircraft via radio communications. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. *See* Exemption Nos. 5778K & 9862A. The equivalent level of safety provided by the fact that aircraft will be piloted by a certified private pilot who has previously trained in remote flight areas before attempting flight within filming distance of structures.

14 CFR §91.119: Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119 (d) allows helicopters to be operated at less than the minimums prescribed, provided the person operating the helicopter complies with any route or altitudes prescribed for helicopters by the FAA. As this exemption is for a UAS, 513 Aerial requests authority to operate at altitudes up to 400 ft. AGL; an exemption may be needed to allow such operations. As set forth herein, the UAS will never operate at higher than 400 ft. AGL. It will however be operated in a controlled area where buildings and people will not be exposed to operations without their pre-obtained consent.

The equivalent level of safety will be achieved given the size, weight, and speed of the UAS as well as location where it is operated. No flight will be taken without the permission of the property owner. Because of the advance notice to the property owner and participants in the photographic activity, all affected individuals will be aware of the planned flight operations as set forth in the Operating Manual. Compared to flight operations with aircraft or rotorcraft weighing far more than the maximum 5 lbs. proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft operating at or below 500 ft. AGL. In addition, the low-altitude operations of the UAS will ensure separation between these small UAS operations and the operations of conventional aircraft that must comply with Section 91.119.

14 CFR §91.121: Altimeter Settings

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

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

Section 91.151 (a) prohibits an individual from beginning "a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing, and, assuming normal cruising speed – (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes."

The battery powering the UAS provides approximately 25 minutes of powered flight. To meet the 30 minute reserve requirement in 14 CFR §91.151, UAS flights would not be possible. Given the limitations on the UAS's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight or night VFR conditions is reasonable.

Petitioner believes that an equivalent level of safety can be achieved by limiting flights to 25 minutes or 25% of battery power, whichever should occur first. This restriction would be more than adequate return the UAS to its planned landing zone from anywhere in its limited operating area. Similar exemptions have been granted to other operations, including Exemptions 2689F, 5745, 10673, 10808 and 11434.

19 CFR § 91.173: ATC clearance and flight plan in IFR conditions

Petitioner requests an exemption from the IFR-clearance requirement for flights into controlled airspace. It is possible that 513 Aerial may operate the UAS in conditions that are IFR within controlled airspace. It would request that, after contacting ATC for the controlled airspace, it would be allowed to operate in what might be IFR conditions, but where the PIC still has a complete and unfettered line of sight visibility with the UAS.

14 CFR §91.203 (a) and (b): Carrying Civil Aircraft Certification and Registration

The regulation provides in pertinent part:

(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...

(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (b) 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.

The UAS fully loaded weighs no more than 5 lbs. and is operated without an onboard Pilot. As such, there is no ability or place to carry certification and registration documents or to display them on the UAS.

An equivalent level of safety will be achieved by keeping these documents at the ground control point where the Pilot flying the UAS will have immediate access to them, to the extent they are applicable to the UAS, and should they be issued. The FAA has issued numerous exemptions to this regulation. A representative sample of other exceptions includes Exemption Nos. 9565, 9665,

9789, 9789A, 9797, 9797A, 9816A, and 10700.

14 CFR § 91.207: Emergency Locator Transmitter

Section 91.207 prohibits operation of a US-registered aircraft unless it is equipped with an emergency locator transmitter. Given the limited distance of flights of the UAS, 513 Aerial requests and exemption from this FAR.

14 CFR Part 91, Subpart E: Maintenance Inspections

These regulations require that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph C of this section, have discrepancies repaired as prescribed in Part 43 of this chapter...," and others shall inspect or maintain the aircraft in compliance with Part 43. Given that these section and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to the Petitioner.

Maintenance will be accomplished by the operator; pursuant to the Operating manual. An equivalent level of safety will be achieved because these small UAS are very limited in size and will carry a small payload and operate only in restricted areas for limited periods of time. If mechanical issues arise the UAS can land immediately and will be operating from no higher than 400 ft. AGL. As provided in the Operating Manual, the PIC (operator) will ensure that the UAS is in working order prior to initiating flight, and perform required maintenance. Moreover, the operator is the person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

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

Petitioner seeks an exemption from the following rules:

Petition for Exemption.

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

Description of Relief Sought: The Petitioner is seeking an exemption from the above-referenced Federal Aviation Regulations to conduct aerial photography using a light, unmanned aerial vehicle for homeowners, real estate brokers and other real estate professionals seeking to provide aerial images of real estate.

Privacy

All flights will occur over private or controlled access property with the property owner's prior

consent and knowledge, or over remote public land. Image capture of people will rarely take place, but in the event they are, any person whose image is captured will have consented prior to being filmed or otherwise have agreed to be in the area where data collection will take place.

Summary

Satisfaction of the criteria provided in Section 333 of the Reform Act of 2012 – size, weight, speed, operating capabilities, proximity to airports and populated areas and operation within visual line of sight and national security – provide more than adequate justification for the grant of the requested exemptions allowing commercial operation of Petitioner's UAS in the real estate industry pursuant to the User Manual attached as Exhibit A.

Sincerely,

Mark Tepe
Member, 513 Aerial, LLC

Zachary P. Elliott, Esq.
Member and In-House Counsel, 513 Aerial, LLC

Exhibit A

PHANTOM 2 User Manual V1.4

For PHANTOM 2 Flight Controller Firmware version V3.10

& PHANTOM 2 Assistant version V3.8

& PHANTOM RC Assistant version V1.1

2015.01

Congratulations on purchasing your new DJI product. Please thoroughly read the entire contents of this manual to fully use and understand the product.

It is advised that you regularly check the PHANTOM 2's product page at **www.dji.com** which is updated on a regular basis. This will provide services such as product information, technical updates and manual corrections. Due to any unforeseen changes or product upgrades, the information contained within this manual is subject to change without notice.

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

Content

CONTENT **2**

IN THE BOX **4**

LEGEND **4**

1. PHANTOM 2 AIRCRAFT **5**

1.1 Built-in Flight Control System Instructions 5

1.2 Connections with Other DJI Products 5

Important Notes of Using with Other DJI Products *6*

Connections with Other DJI Products *7*

1.3 LED Flight Indicators Description 11

1.4 Notes for PHANTOM 2 using with other DJI products 12

2 PROPELLERS **13**

2.1 Assembly 13

2.2 Disassembly 13

2.3 Notes 13

3 REMOTE CONTROLLER **14**

3.1 Power on the Remote Controller 14

3.2 Remote Controller LED Indicator Status 15

3.2.1 Remote Controller Power LED Indicator Status *15*

3.2.2 Remote Controller Battery Level Indicator Status *15*

3.3 Antenna Orientation 16

3.4 Remote Controller Operation 16

3.5 Linking the Remote Controller & Built-in Receiver 18

4 INTELLIGENT BATTERY **19**

4.1 Charging Procedures 19

4.2 Install the Battery 20

4.3 Battery Usage 20

4.4 Description of the Battery Level Indicator 21

4.5 Correct Battery Usage Notes 22

5 CALIBRATING THE COMPASS **23**

5.1 Calibration Warnings 23
5.2 Calibration Procedures 23
5.3 When Recalibration is required 23

6 FLIGHT 24

6.1 Flying Environment Requirements 24
6.2 Starting the Motors 24
6.3 Takeoff/Landing Procedures 24
6.4 Failsafe Function 25
6.5 Low Battery Capacity Warning Function 27
6.6 Flight Limits Function 27
Max Height & Radius Limits 27
6.7 Flight Limits of Special Areas 28
6.8 Conditions of Flight Limits 30
Disclaimer 30

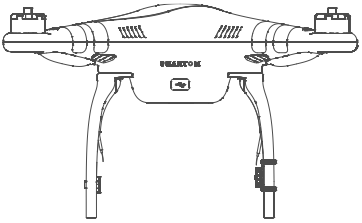
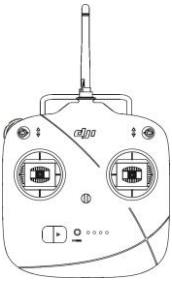
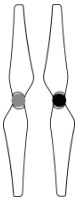
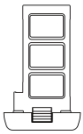
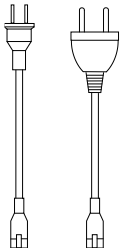
7 ASSISTANT INSTALLATION AND CONFIGURATION 31

7.1 Installing Driver and PHANTOM 2 Assistant 31
7.2 Using the PHANTOM 2 Assistant on a PC 32
7.3 Firmware upgrade of PHANTOM 2 33
7.4 PHANTOM RC Assistant Description 33

8 APPENDIX 35

8.1 Specifications 35
8.2 LED Flight Indicators Description 35

In the Box

PHANTOM 2	Remote Controller-2.4GHz	Propeller Pair
		
Intelligent Battery	Charger	Plug Set
		
Screwdriver	Assistant Wrench	Cables
		
Micro-USB Cable	Screws	Accessories Box
		

Legend

Forbidden(Important) Caution Tip Reference

1 PHANTOM 2 Aircraft

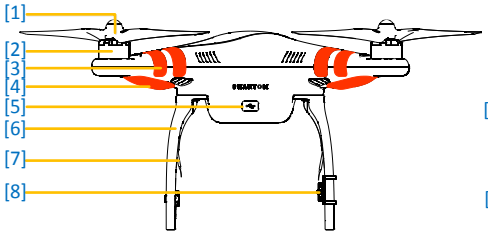


Figure 1-1

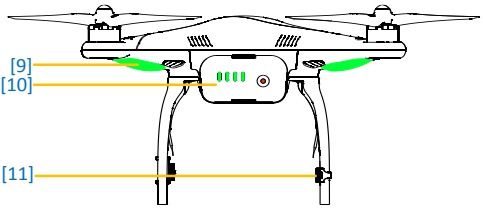


Figure 1-2

[1]Propeller [2]Motor [3]Front Side [4]Front LEDs [5]Micro-USB Port [6]Landing Gear [7]Receiver Antenna [8]CAN-Bus Connector [9]LED Flight Indicators [10]DJI Intelligent Battery [11]Compass

1.1 Built-in Flight Control System Instructions

The built-in flight control system is used to control the entire aircraft's functions in flight such as Pitch (forwards and backwards), Roll (left and right), Elevator (up and down) and Yaw (turn left or right). The flight controller contains the MC (Main Controller), IMU, GPS, compass, receiver.

The IMU (Inertial Measurement Unit) has a built-in inertial sensor and a barometric altimeter that measures both attitude and altitude. The compass reads geomagnetic information which assists the GPS (Global Position System) to accurately calculate the aircrafts position and height in order to lock the aircraft in a stable hover. The receiver is used to communicate with the remote controller and the MC acts as the brains of the complete flight control system connecting and controlling all the modules together.

The PHANTOM 2 can be configured in the Assistant, by choosing Naza-M mode or Phantom 2 mode. This manual is for Phantom 2 mode. Please refer to the Naza-M V2 Quick Start Manual for more information.

1.2 Connections with Other DJI Products

PHANTOM 2 is compatible with other DJI products, including ZENMUSE H3-2D and H3-3D gimbal , iOSD mini , iOSD Mark II. Below are connections for these products and wireless video transmission module.

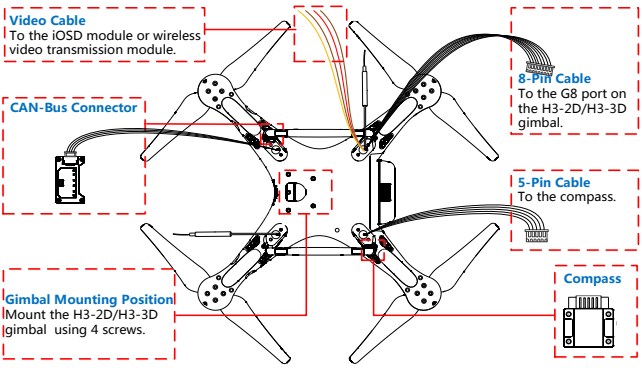


Figure 1-3

Important Notes of Using with Other DJI Products

(1) The video cable can provide power for the wireless video transmission module with a battery voltage (11.1V~12.6V) and a maximum current 2A.

(2) Make sure the working current of the wireless video transmission module you connect can work with an operational voltage between 11.1V~12.6V and the total working current of the iOSD and wireless video transmission module is under 2A, as an overcurrent will damage the central board's components. If the total current exceeds 2A, please be sure to provide power supplied from a separate power source for the wireless video transmission module.

(3) PHANTOM 2 uses a 2.4GHz RC system. To avoid communication interference, it's not recommended to use other 2.4GHz devices (including 2.4G Wi-Fi or 2.4G wireless video transmission module) except the 2.4G Bluetooth and 2.4G Datalink.

(4) Be sure to keep the wireless video transmission module and other communicating devices away from the compass during installation and connection to avoid interference.

(5) To improve the compatibility with ZENMUSE gimbals, the latest factory deliveries of PHANTOM 2 has updated to the Version 2 shown below. H3-2D/H3-3D gimbal can be directly installed for the Version 2 while for Version 1, a H3-3D adapter kit (coming soon) is required to install the H3-3D gimbal.

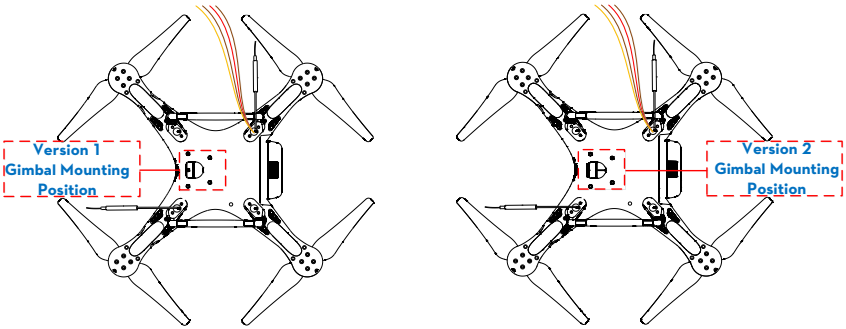


Figure 1-4

(6) When using the H3-3D gimbal, please connect the 8-Pin cable of PHANTOM 2 to the G8 port of H3-3D shown below.

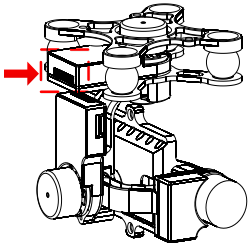


Figure 1-5

Connections with Other DJI Products

(1) Connecting the H3-2D and H3-3D gimbal and wireless video transmission module, the figure below uses H3-2D as an example.

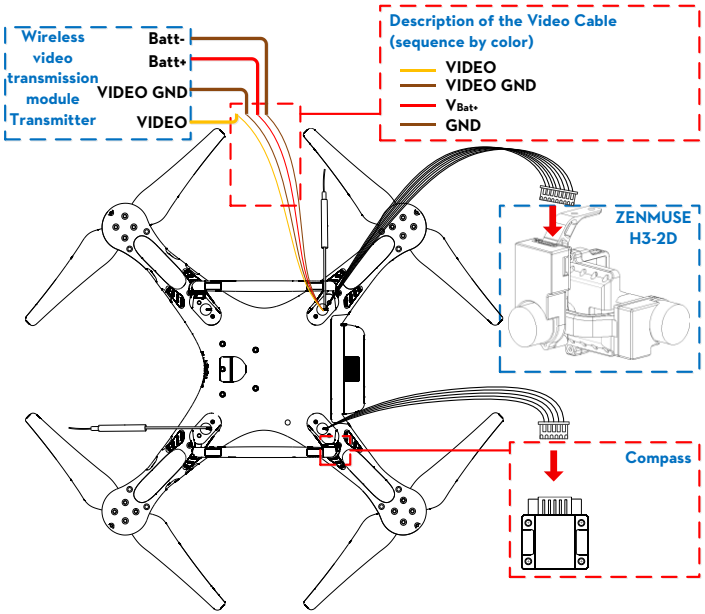


Figure 1-6

(2) Connecting the H3-2D and H3-3D gimbal, iOSD mini and wireless video transmission module, the figure below uses H3-2D as an example.

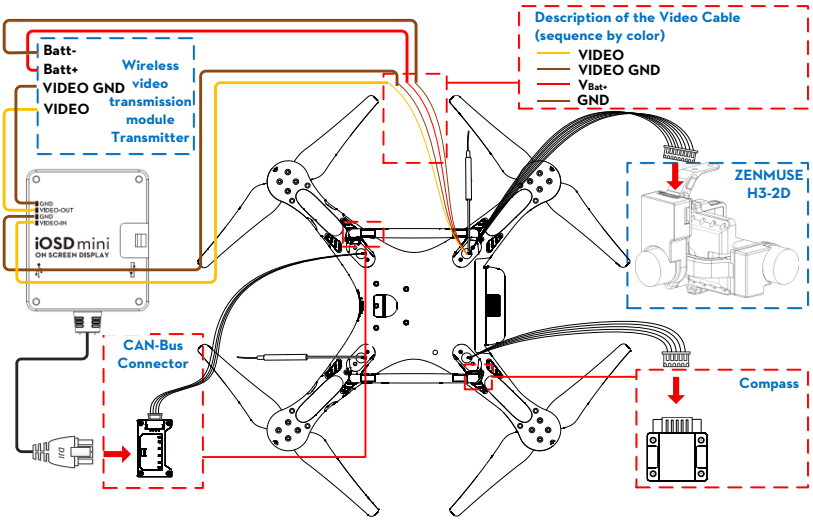


Figure 1-7

(3) Connecting the H3-2D and H3-3D gimbal, iOSD mini and DJI specified wireless video transmission module AVL58, the figure below uses H3-2D as an example.

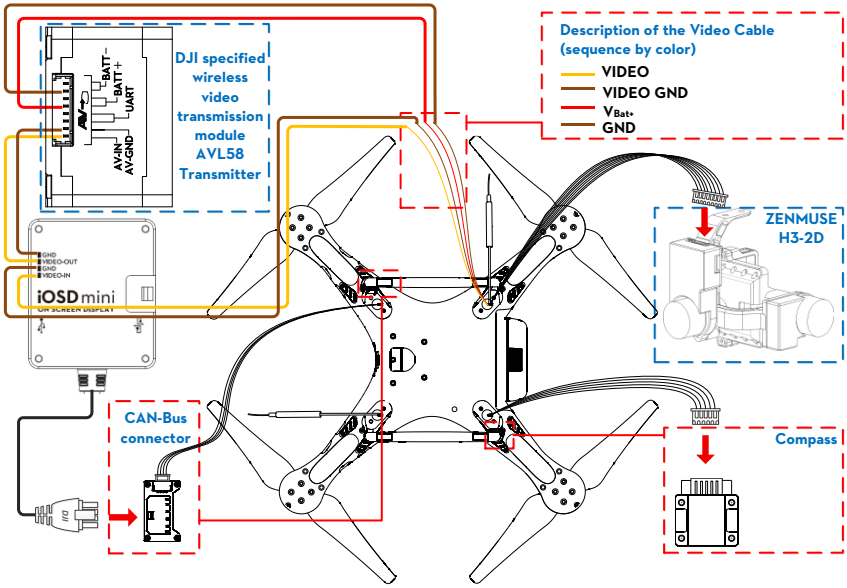


Figure 1-8

We recommend connecting the V_{Bat+} port of the video cable to the two BATT+ ports of the AVL58 simultaneously. The same is true of the GND port of the video cable and two BATT- ports.

(4) Connecting the H3-2D and H3-3D gimbal, iOSD Mark II and wireless video transmission module, the figure below uses H3-2D as an example.

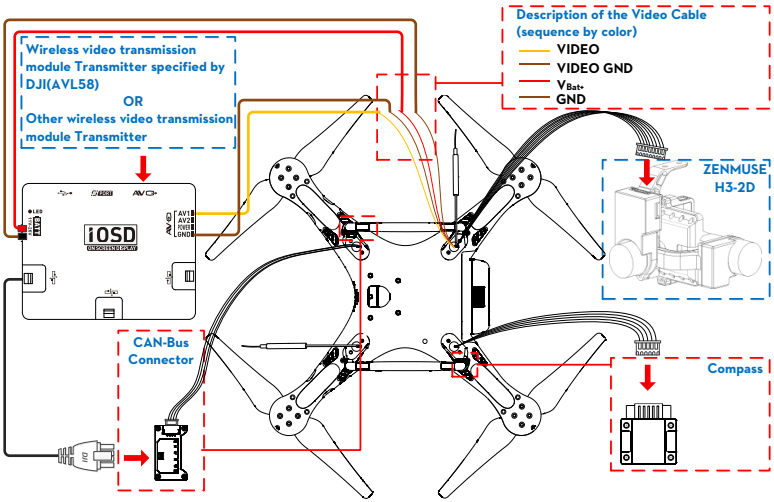
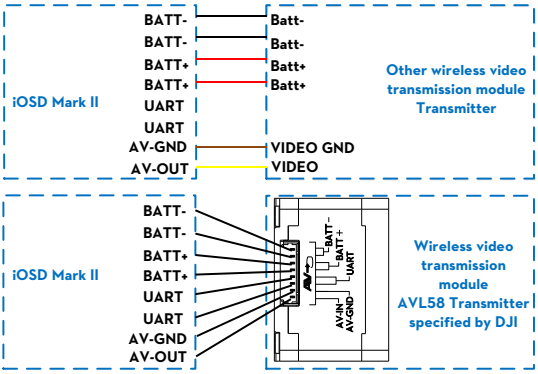


Figure 1-9

The diagram below illustrates the conneciton between the iOSD Mark II and the wireless video transmission module.



Use the 8-Pin cable in the iOSD Mark II package when connecting to the DJI specified wireless video transmission module AVL58.

(5) Using the iPad Ground Station

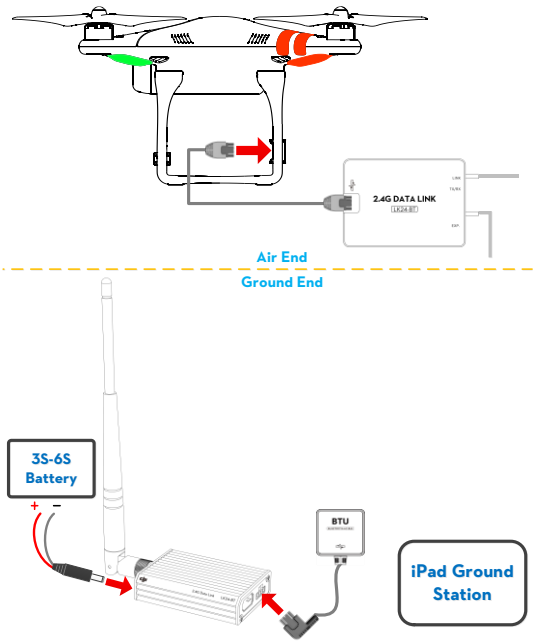


Figure 1-10

Connect the Air End of 2.4G Bluetooth Datalink to a spared CAN-Bus port of iOSD if an iOSD is used.

(6) Using the PC Ground Station

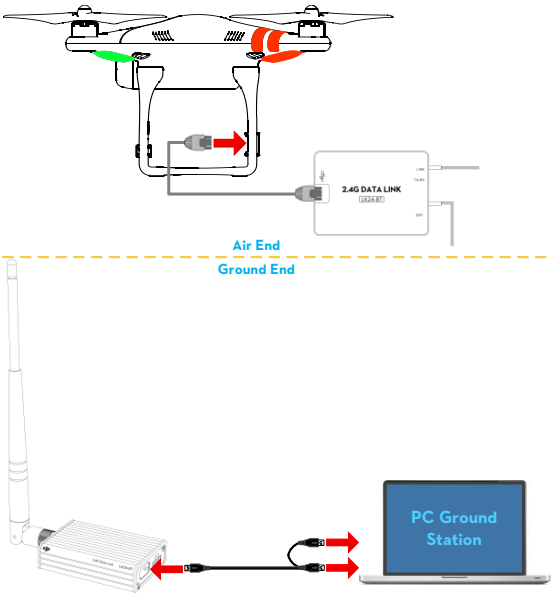
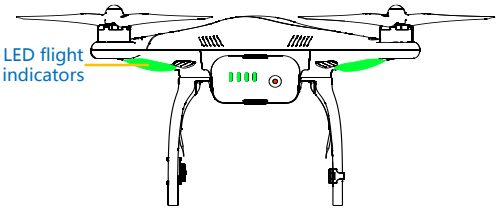


Figure 1-11

1.3 LED Flight Indicators Description

1. **LED flight indicators** are used to show the aircraft's current status. Once powered on, the indicators will light up.

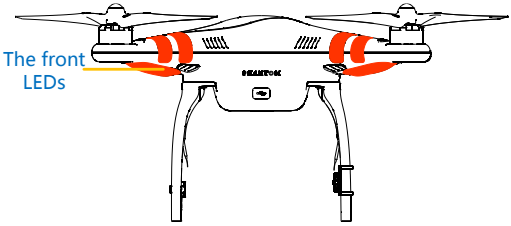


Aircraft in Normal status	Descriptions
	Power On Self-Test
	Warming Up & Aircraft cannot take off during warming up
	Ready to Fly
	Ready to Fly (non-GPS)
Aircraft in abnormal status	**Warnings and errors**
	Remote Controller Signal Lost
	1st Level Low Battery Capacity Warning
	2nd Level Low Battery Capacity Warning
	Not Stationary or Sensor Bias is too big
	Errors & Aircraft cannot fly.
	Compass data abnormal because of ferro-magnetic interference or the compass needs calibration.

⚠ (1) The LED indicators diagram above are for Phantom 2 mode. In Naza-M mode, LED indicators will work according to the Naza-M flight control system.

(2) Connect to the PHANTOM 2 Assistant for detailed information about warnings and errors.

2. The front LEDs are for indicating where the nose of the aircraft is. They light up solid red only after the motors have spooled up.



1.4 Notes for PHANTOM 2 using with other DJI products

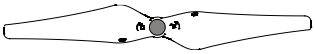
Before using PHANTOM 2 with other DJI products, users should connecting the products correctly and upgrade the firmware as requirements below .

Items to upgrade	Firmware versions required	Assistant for upgrading	Assistant version
P330CB (built-in central board)	V1.0.1.19 or above	PHANTOM 2	V1.08 or above
Zenmuse H3-2D	CMU V1.0 , IMU V1.6 or above	PHANTOM 2	V1.08 or above
iOSD Mark II	V3.01 or above	iOSD	V4.0 or above
iOSD mini	V1.06 or above	iOSD	V4.0 or above

*The iOSD Assistant is applied to both iOSD Mark II and iOSD mini.

2 Propellers

PHANTOM 2 uses the original 9-inch propellers which are classified by the color of each central nut. Damaged propellers should be replaced by purchasing new ones if necessary.

Propellers	Grey Nut (9450)	Black Nut (9450 R)
Diagram		
Assembly Location	Attach to the motor thread that **does not have a black dot**.	Attach to the motor thread that **has a black dot**.
Fastening/Un-fastening Instructions	Lock: Tighten the propeller in this direction. Unlock: Remove the propeller in this direction.	

2.1 Assembly

1. (Figure 2-1) Remove the four warning cards from the motors after you've read them.
2. (Figure 2-2) Prepare the two grey nut propellers and two black nut propellers. Make sure to match the black nut propellers with the correctly marked black dot motors. Tighten the propellers according to the fastening instructions.

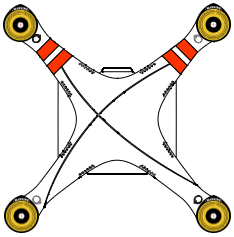


Figure 2-1

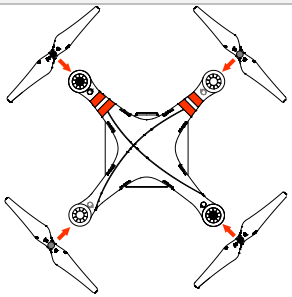


Figure 2-2

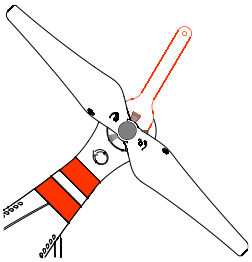


Figure2-3

2.2 Disassembly

(Figure 2-3) Keep the motor deadlocked in place with the assistant wrench (or one hand) and remove the propeller according to the un-fastening instructions.

2.3 Notes

1. Propellers are self tightening during flight. DO NOT use any thread locker on the threads.
2. Make sure to match the propeller nut colors with the corresponding motors.
3. It is advised to wear protective gloves during propeller assembly and removal.
4. Check that the propellers and motors are installed correctly and firmly before every flight.
5. Check that all propellers are in good condition before flight. DO NOT use any ageing, chipped, or broken propellers.
6. To avoid injury, STAND CLEAR of and DO NOT touch the propellers or motors when they are spinning.
7. ONLY use original DJI propellers for a better and safer flight experience.

3 Remote Controller

The PHANTOM 2 remote controller can be configured in the PHANTOM RC Assistant. The sticks mode is Mode 2 on delivery.

⚠	For upgraded remote controller (models: NDJ6 or NRC900), select “Upgrade Version” in Phantom Assistant. For basic remote controller (models: DJ6 or RC900), select “Basic Version” in Phantom Assistant.

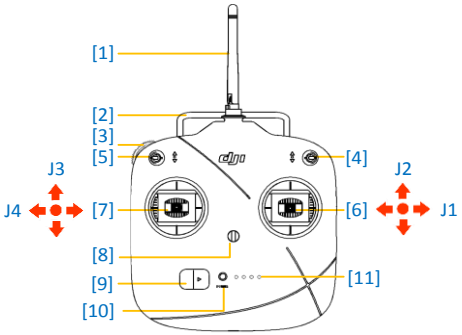


Figure 3-1

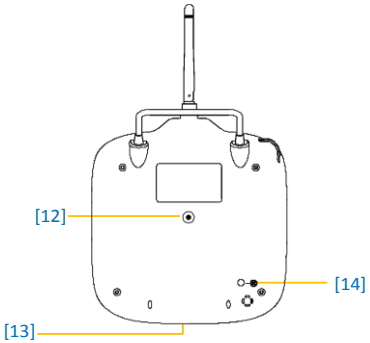


Figure 3-2

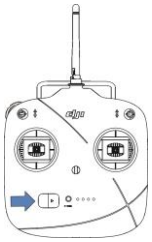
[1]Antenna [2]Carrying Handle [3]Left Dial [4]3-Position Switch S1 [5]3-Position Switch S2 [6]Joystick1(J1;J2) [7]Joystick2(J3;J4) [8]Neck Strap Attachment [9]Power Switch [10]Power Indicator

[11]Battery Level Indicators LED1/LED2/LED3/LED4 (from left to right) [12]Trainer Port

[13]Battery Charge & RC Assistant Port (micro-USB port) [14] Potentiometer

3.1 Power on the Remote Controller

1. Set the S1 and S2 switches to the upper most position and ensure both joysticks are at the mid-point position. Then toggle on the power switch.
2. Push the power switch to the right to power on the remote controller. If the power LED indicator is solid on, the remote controller is functioning normally. The battery level indicators display the current battery level.



⚠

1. Please make sure the battery level of remote controller is enough. If the low voltage warning alert sounds (refer to <Remote Controller Power LED Indicator Status>), please recharge the battery as soon as possible.
2. Charge the remote controller´s battery by using the included micro-USB cable. Using the incorrect type of charging cable may cause damage.
3. Turn off the remote controller before charging. The power LED indicator will display solid red when charging is in progress. The LED indicators will display solid green when the battery is fully charged.

3.2 Remote Controller LED Indicator Status

3.2.1 Remote Controller Power LED Indicator Status

Power LED Indicator	Sound	Remote Controller Status
	None	Functioning normally.
	None	Charging(remote controller is powered off)
	None	Remote controller joysticks calibration error, need to be re-calibrate.
	BB---BB---BB	Low voltage (from 3.5V-3.53V), recharge the remote controller.
	B-B-B.....	Critical low voltage (from 3.45V-3.5V). Recharge the remote controller immediately.
	B--B--B.....	Alert will sound after 15 minutes of inactivity. It will stop once you start using the remote controller.

The remote controller will power off automatically when battery voltage drops below 3.45V. Land and recharge the battery as soon as possible when the low voltage alert occurs to avoid loss of control during flight.

3.2.2 Remote Controller Battery Level Indicator Status

The battery level indicators will show the current battery level during both the discharging process. The following is a description of the indicators.

: The LED is solid on : The LED will blink regularly

: The LED is light off

Discharging process				
LED1	LED2	LED3	LED4	Current battery level
				75%~100%
				50%~75%
				25%~50%
				12.5%~25%
				0%~12.5%
				<0%

3.3 Antenna Orientation

The remote controller's antenna should point skywards without obstructions for maximum communication range during flight.

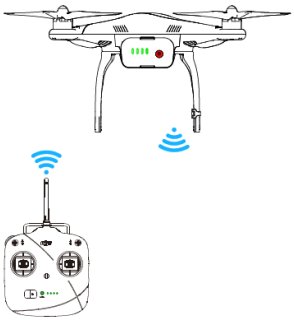


Figure 3-3

3.4 Remote Controller Operation

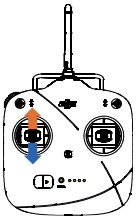
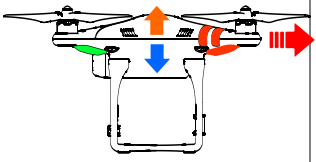
The operations of remote controller are based on mode 2 stick configuration.

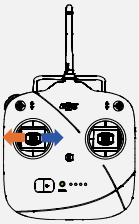
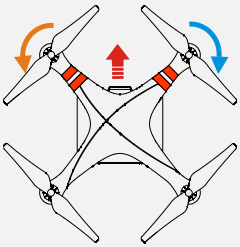
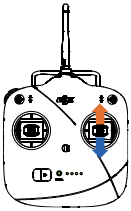
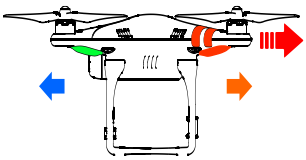
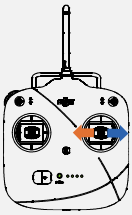
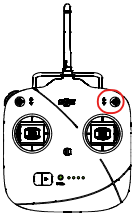
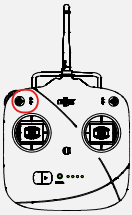
Definitions

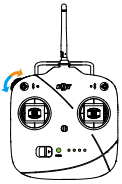
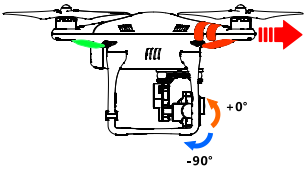
The **'stick neutral'** positions and **'stick released'** mean the control sticks of the remote controller are placed at the central position.

To **'move the stick'** means that the stick of remote controller is pushed away from the central position.

Slide Lever is used for the pitch control of the H3-2D and H3-3D gimbal.

Remote Controller (Mode 2)	**Aircraft** (nose direction)	**Operation details**
		The throttle stick controls aircraft altitude/elevation. Push the stick up and the aircraft will rise. Pull the stick down and the aircraft will descend. The aircraft will automatically hover and hold its altitude if the sticks are centered. Push the throttle stick above the centered (mid-point) position to make the aircraft take off. When flying, we suggest that you push the throttle stick slowly to prevent the aircraft from sudden and unexpected elevation changes.

		The yaw stick controls the aircraft rudder. Push the stick left and the aircraft will rotate counter clock-wise. Push the stick right and the aircraft will rotate clock-wise. If the stick is centered, the aircraft will remain facing the same direction. The yaw stick controls the rotating angular velocity of the aircraft. Pushing the stick further away from center results in a faster aircraft rotation velocity.
		The pitch stick controls the aircraft ' s front & back tilt. Push the stick up and the aircraft will tilt and fly forward. Pull the stick down and the aircraft will tilt and fly backward. The aircraft will keep level and straight if the stick is centered. Pushing or pulling the stick further away from center will result in a larger tilt angle (maximum of is 35°) and faster flight velocity.
		The roll stick controls the aircraft ' s left & right tilt. Push the stick left and the aircraft will tilt and fly left. Push the stick right and the aircraft will tilt and fly right. The aircraft will keep level and straight if the stick is centered. Pushing the stick further away from center will result in a larger tilt angle (maximum of 35°) and faster flight velocity.
	 Position-1 Position-2 Position-3	S1 is for compass calibration. Toggle the S1 switch from position-1 to position-3 and back to position-1 at least 5 times, which will force the aircraft to enter into compass calibration mode. Users can configure position 3(bottom position) of the S1 switch to trigger the Failsafe in the Assistant.
	 OFF Course Lock point Lock Home	S2 is the IOC mode switch. IOC (Intelligent Orientation Control) function can be enabled in the Assistant when in Naza-M mode. Only use the IOC function after you are familiar with flying.

		The left dial controls the pitch of the H3-2D and H3-3D gimbal. The position of left dial determines the pitch angle relative to the horizontal level. Turn the left dial to the right to make the gimbal pitch up. Turn the left dial to the left to make the gimbal pitch down. The gimbal will keep its current position if the dial is static.

(1) For `Ready to Fly´ the aircraft will hover when all sticks are released.

(2) For `Ready to Fly (non-GPS)´ the aircraft will only keep the altitude when all sticks are released.

3.5 Linking the Remote Controller & Built-in Receiver

PHANTOM 2 has a built-in receiver, the link button and indicator located on the bottom of the aircraft as illustrated in the Figure 3-4.

The link between the remote controller and aircraft is already established for you so you can initially skip this procedure. If you ever replace the remote controller, re-establishing the link is required.

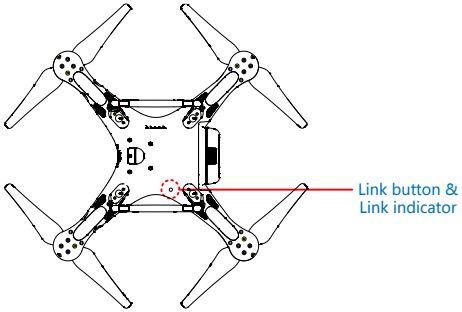


Figure 3-4

Linking procedures

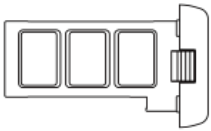
1. Power on the PHANTOM 2.
2. Turn on the remote controller and place it 0.5m~1m away from the aircraft.
3. Push the link button with a thin object and hold it until the Link indicator blinks red, then release it.
4. When the Link indicator turns solid green, the link between the remote controller and the built-in receiver has been successfully established.

Link Indicator	Status
	The remote controller is turned off and there is no 2.4GHz signal around, please turn on the remote controller.
	The receiver is ready for linking.
	There is 2.4GHz signal around but the remote controller is not linked with the receiver,

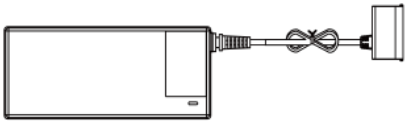
	please carry out the linking procedures.
	The remote controller is linked with the receiver successfully.

4 Intelligent Battery

The intelligent battery is specially designed for the PHANTOM 2, with a battery capacity of 5200mAh, voltage of 11.1V and charge-discharge management functionality. The battery should only be charged with the DJI charger.



Intelligent Battery



Charger

DJI Intelligent Battery Functions	
(1) Balance Charging	Automatically balance the voltage of each battery cell during charging.
(2) Capacity Display	Display the current battery level.
(3) Communicating	The main controller communicates with the battery via communication ports for battery voltage, capacity, current and other information.
(4) Overcharging Protection	Charging stops automatically when the battery voltage reaches 12.8V to prevent overcharging damage.
(5) Over Discharging Protection	Discharging stops automatically when the battery voltage reaches 8.4V to prevent over discharging damage.
(6) Short Circuit Protection	Automatically cuts off the power supply when a short circuit is detected.
(7) Sleep Protection	The battery will enter sleep mode after 10 minutes of inactivity to save power. The static current is 10nA in sleep mode when the battery is powered on without connecting to other devices.
(8) Charging Temperature Detection	The battery will charge only when its temperature is within 0℃-55℃. If the battery temperature is out of this range, the battery will stop charging.

(1) Before use, please read and follow the user manual, disclaimer, and the warnings on the battery. Users take full responsibility for all operations and usage.

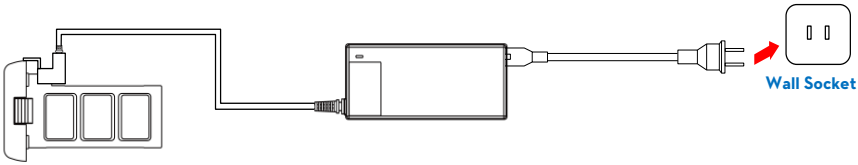
(2) The battery should only be charged with the charger provided by DJI. DJI does not take any responsibility for operation of any charger from a third party.

4.1 Charging Procedures

1. Connect the charger to a wall socket (Use the plug set if necessary).
2. Connect the battery to the charger. If the current capacity of the battery is over 75%, you should power on the battery to begin charging.
3. The Battery Level indicators display current capacity level as the battery charges. Please refer to battery

level indicator description for details.

4. The battery is fully charged when the Battery Level indicator lights are off. Please disconnect the charger and battery when the charging is completed.



4.2 Install the Battery

Push the battery into the battery compartment correctly as the following diagram shows. Make sure to push the battery into the compartment until you hear a `click' sound.

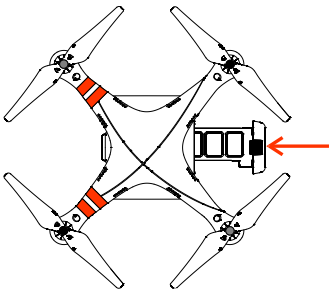


Figure 4-1

An incorrectly inserted battery may cause one of the following to occur: (1) Bad contact. (2) Unavailable battery information. (3) Unsafe for flight. (4) Unable to take off.

4.3 Battery Usage

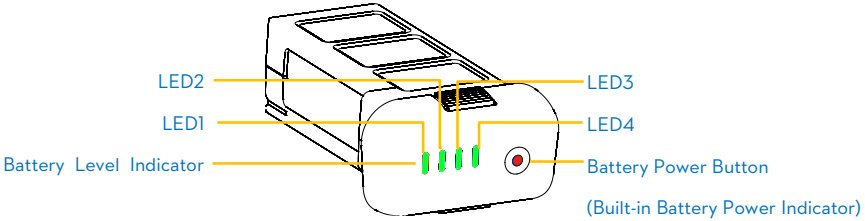


Figure 4-2

(1) Checking the battery level: When the battery is powered off; pressing the battery power button once will indicate the current battery level. Refer to < Battery Level Indicator Description> for details.

(2) Powering on: When the battery is powered off; press the battery power button once and then press and hold for 2 seconds to turn on the intelligent battery.

(3) Powering off: When the battery is powered on; press the battery power button once and then press and hold for 2 seconds to turn off the intelligent battery.

(4) Checking the battery life: When the battery is powered off; press and hold the battery power button for 5 seconds to check the battery life. The battery level indicators will show the life and the battery power indicator will blink for 10 seconds, then all LEDs will light out and the intelligent battery will turn off. Refer to < Battery Level Indicator Description> for details.

More battery information is available in the battery tab of the PHANTOM 2 Assistant.

4.4 Description of the Battery Level Indicator

The battery level indicators will show the current battery level during both the charging and discharging process as well as battery life. The following is a description of the indicators.

■ : The LED is solid on ● : The LED will blink regularly

■ : The LED is light off

Charging process				
LED1	LED2	LED3	LED4	Current battery level
●	■	■	■	0%~25%
●	●	■	■	25%~50%
●	●	●	■	50%~75%
●	●	●	●	75%~100%
■	■	■	■	Full charged

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

Battery life				
LED1	LED2	LED3	LED4	Current battery life
■	■	■	■	90%~100%

■	■	■	●	80%~90%
■	■	■	■	70%~80%
■	■	●	■	60%~70%
■	■	■	■	50%~60%
■	●	■	■	40%~50%
■	■	■	■	30%~40%
●	■	■	■	20%~30%
■	■	■	■	Less than 20%

4.5 Correct Battery Usage Notes

1. Never plug or unplug the battery into the aircraft when it is powered on.
2. The battery should be charged in an environment that is between 0℃ to 40℃, and be discharged in an environment that is between -20℃ to 50℃. Both charging and discharging should be in an environment where the relative humidity is lower than 80%.
3. It's recommended to charge and discharge the battery thoroughly once every 20 charge/discharge cycles. Users should discharge the battery until there is less than 8% power left or until the battery can no longer be turned on. Users should then fully recharge the battery to maximum capacity. This power cycling procedure will ensure the battery is working at its optimal level.
4. For long term storage please place the battery with only a 40~50% capacity in a strong battery box securely. We recommend discharging and charging the battery completely once every 3 months to keep it in good condition. The capacity should be varied in such a cycle (40%~50%)—0%—100%—(40%~50%).
5. It's suggested you purchase a new battery after you have discharged your current battery over 300 times. Please completely discharge a battery prior to disposal.
6. It's suggested that you purchase a new battery if the current battery is swollen or damaged in any way.
7. Never try to recharge or fly with a battery that is swollen or damaged in any way.
8. Never charge the battery unattended. Always charge the battery on a non-flammable surface such as concrete and never near any flammable materials.
9. Safety is extremely important and users can get more information in the DISCLAIMER.

5 Calibrating the Compass

IMPORTANT: Make sure to perform the Compass Calibration procedures prior to the first flight.

The compass is very sensitive to electromagnetic interference which causes abnormal compass data and leads to poor flight performance or even flight failure. Regular calibration of the compass enables the compass to perform at its optimal level.

5.1 Calibration Warnings

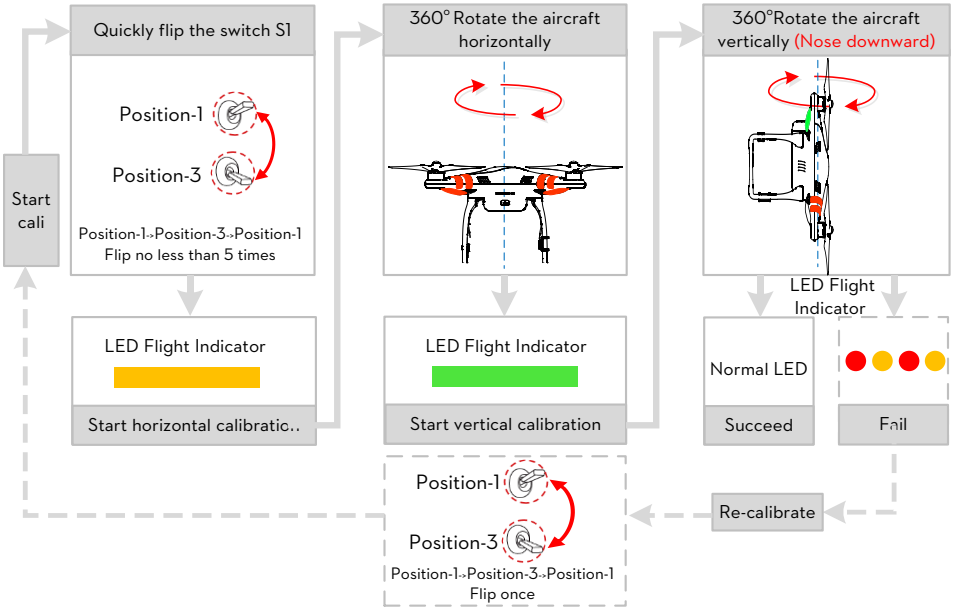
(1) DO NOT calibrate your compass where there is a possibility for the existence of strong magnetic interference such as magnetite, parking structures, and steel reinforcement underground.

(2) DO NOT carry ferromagnetic materials with you during calibration such as keys or cellular phones.

(3) Compass Calibration is very important; otherwise the flight control system will work abnormally.

5.2 Calibration Procedures

Please carry out the calibrating procedures in the flight field before flight. Please watch the quick start video of the PHANTOM 2 for more compass calibration details.



5.3 When Recalibration is required

(1) When Compass Data is abnormal, the LED flight indicator will blink alternating between red and yellow.

(2) Last compass calibration was performed at a completely different flying field/location.

(3) The mechanical structure of the aircraft has changed, i.e. changed mounting position of the compass.

(4) Evident drifting occurs in flight, i.e. the aircraft doesn't fly in straight lines.

6 Flight

6.1 Flying Environment Requirements

(1) Before your first flight, please allow yourself some flight training (Using a flight simulator to practice flying, getting instruction from an experienced person, etc.).

(2) DO NOT fly in bad weather, such as rain or wind (more than moderate breeze) or fog.

(3) The flying field should be open and void of tall buildings or other obstacles; the steel structure within buildings may interfere with the compass.

(4) Keep the aircraft away from obstacles, crowds, power lines, trees, lakes and rivers etc.

(5) Try to avoid interference between the remote controller and other wireless equipment (No base stations or cell towers around).

(6) The flight control system will not work properly at the South Pole or North Pole.

(7) Never use the aircraft in a manner that infringes upon or contravenes international or domestic lays and regulations.

6.2 Starting the Motors

A Combination Stick Command (CSC) is used to start the motors. Push the sticks according to one of the options below to start motors. Once the motors have started, release both sticks simultaneously. The same CSC is used to stop the motors.

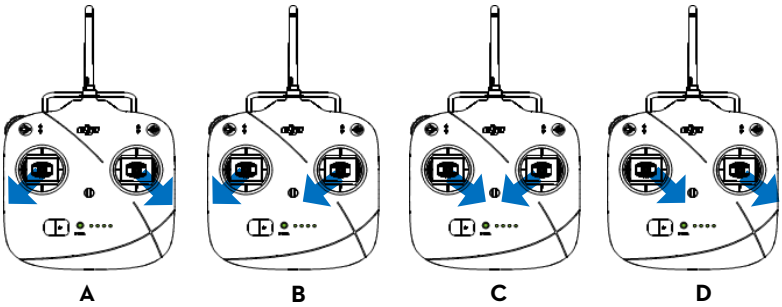


Figure 6-1

6.3 Takeoff/Landing Procedures

1. Start by placing the PHANTOM 2 on the ground with the battery level indicators facing you.
2. Turn on the remote controller.
3. Power on the aircraft by turning on the intelligent battery.
4. When LED flight indicator blinks green/yellow, the PHANTOM 2 is entering Ready to Fly/Ready to Fly (non-GPS) mode. Start the motors with the CSC command.
5. Push the throttle stick up slowly to lift the aircraft off the ground. Refer to <Remote Controller Operation> for more details.
6. Be sure you are hovering over a level surface. Pull down the throttle stick to descend. The stick will lock into

place and the aircraft will descend steadily.

7. After landing, leave the throttle stick down for 3 to 5 seconds to stop the motors. Return throttle stick to middle position after the motors have stopped.

You SHOULD NOT execute the CSC during normal flight! This will stop the motors and cause the aircraft to descend rapidly and drop without any type of control.

(1) When the LED flight indicator blinks yellow rapidly during flight, the aircraft has entered into Failsafe mode, refer to <Failsafe Function> for details.

(2) A low battery capacity warning is indicated by the LED flight indicator blinking red slowly or rapidly during flight. Refer to the <Low Battery Capacity Warning Function> for details.

(3) Watch the quick start video about flight for more flight information.

(4) Aircraft and battery performance is subject to environmental factors such as air density and temperature. Be very careful when flying 3000 meters (9800 feet) or more above sea level, as battery and aircraft performance may be reduced.

(5) When used with a H3-3D gimbal, a GoPro camera, and the iOSD mini, your Phantom 2 will be very close to its maximum takeoff weight. It is not recommended that you attach the Phantom 2 propeller guards at this weight. Otherwise, the aircraft will be unable to fly normally.

6.4 Failsafe Function

The aircraft will enter Failsafe mode when the connection from the remote controller is lost. The flight control system will automatically control the aircraft to return to home and land to reduce injuries or damage. The following situations would make the aircraft fail to receive a signal from the remote controller and enter Failsafe mode:

(1) The remote controller is powered off.

(2) The remote controller is powered on but the S1 is toggled in the position triggering the Failsafe (this must have been configured in the PHANTOM 2 Assistant).

(3) The aircraft has flown out of the effective communication range of the remote controller.

(4) There is an obstacle obstructing the signal between the remote controller and the aircraft, essentially reducing the distance the signal can travel.

(5) There is interference causing a signal problem with the remote controller.

Failsafe works differently depending on the mode the aircraft is in when Failsafe mode is initiated whether it is in the Ready to Fly or Ready to Fly (non-GPS) mode.

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

The flight control system will try to keep the aircraft level during descent and landing. Note that the aircraft may be drifting 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.

Home Point

When the aircraft is initializing the Ready to Fly status, the aircraft will record the current GPS coordinates as the home point. It is recommended to lift off only after Ready to Fly status is confirmed for the safety of being able to fly back to home point successfully in case the Failsafe mode is initiated.

Go Home Procedures

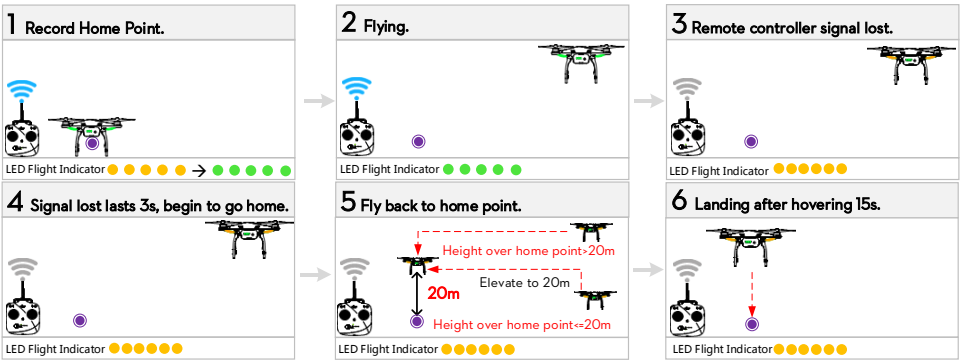


Figure 6-2

(1) In a Failsafe situation, if less than 6 GPS satellites are found for more than 20 seconds, the aircraft will descend automatically.

(2) When the aircraft is landing automatically, users can control the aircraft's position and altitude if the remote controller signal is recovered.

In Phantom 2 mode, users can set a new home point manually when the aircraft is in "Ready to fly" status as long as a home point has been recorded automatically. Quickly flipping the S2 switch of the remote controller from upper most to lower most positions 5 times or more will reset the current aircraft position as a new home point of PHANTOM 2. When successfully reset, you will see a series of rapid green blinks on the LED Flight Indicator. The definition of "home point" is:

(1) The home point is the place PHANTOM 2 returns to when the control signal is lost, which is recorded last time.

(2) The home point is used to calculate the horizontal distance between you and the aircraft, the distance will be displayed as if using iOSD module.

Regaining Control during Failsafe Procedure

Position of Switch S1	Position-1	Position-2	Position-3 (No triggering the Failsafe)
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 remote controller's signal is recovered, control is returned back to the pilot.	Regain control as soon as signal is recovered.	

6.5 Low Battery Capacity Warning Function

The low battery capacity 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 has two levels of low battery capacity warning. The first appears when the battery has less than 30% power and the second appears when it has less than 15% power.

(1) When battery power drops below 30% and LED indicator will blink red slowly.

(2) At lower than 15% the LED indicator will blink red rapidly, the PHANTOM 2 will also begin to descend and land automatically. After it has landed, keep the throttle stick at its lowest point or execute CSC.

(3) There is a hidden third low battery threshold in addition to the 1st and 2nd level warnings. This uses 10.65V as its threshold. Both this voltage threshold and the 2nd Level Low Battery Warning will trigger auto-landing. Altitude can be maintained if necessary by pushing up on the throttle stick.

(1) Remember to fly your PHANTOM 2 back as soon as you see a low battery capacity warning.

(2) Keeping the battery contact needles and pads clean is very important. Any dirt and dust may cause a communication failure.

6.6 Flight Limits Function

All UAV (unmanned aerial vehicle) operators should abide by all regulations from such organizations at ICAO (International Civil Aviation Organization) and per country 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.

In Ready to Fly status, height, distance limits works together to restrict the flight. In Ready to Fly (non-GPS) status, only height limit works and the flying height restricted to be not over 120m.

(1) The default parameters in the Assistant is 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 the parameters to comply with these rules too, before using the PHANTOM 2.

(2) Users in Mainland China can refer to 民用航空空域使用办法.

Max Height & Radius Limits

The Max Height & Radius restricts the flying height and distance. Configuration can be done in the PHANTOM 2 Assistant. Once complete, your aircraft will fly in a restricted cylinder.

Figure 6-3

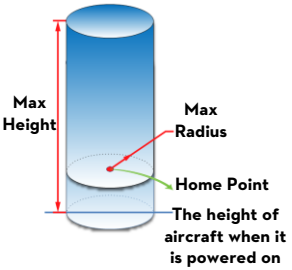


Figure 6-4

Ready to Fly			
	Limits	**Ground Station**	**Rear LED flight indicator**
Max Height	The flight height is restricted to fly under the max height.	Warning: Height limit reached.	None.
Max Radius	The flight distance is restricted to fly within the max radius.	Warning: Distance limit reached.	Rapid red flashings when close to the Max radius limit.

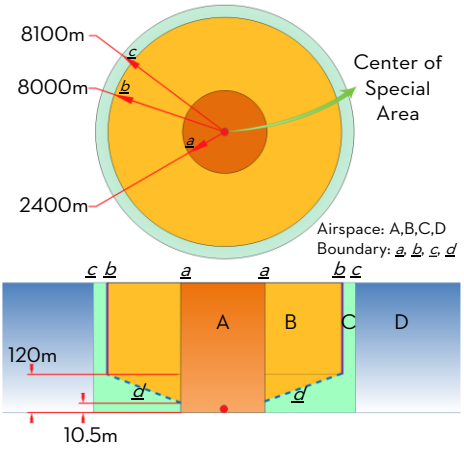
Ready to Fly(non-GPS)			
	Flight Limits	**Ground Station**	**Rear LED flight indicator**
Max Height	The flight height is restricted to fly under the minor height between the Max height and 120m.	Warning: Height limit reached.	None.
Max Radius	Not limited, no warnings or LED indicators.		

(1) If the aircraft flies out of the limits, you can still control your aircraft except to fly it further away.

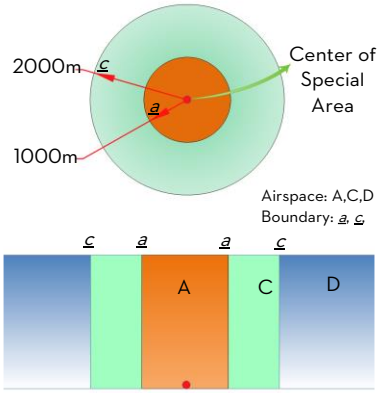
(2) If the aircraft is flying out of the max radius in Ready to Fly (non-GPS) status, it will fly back within the limits range automatically if 6 or more GPS satellites have been found.

6.7 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.



Category A



Category B

Ready to Fly		
Airspace	**Limits**	**Rear LED Flight Indicator**
A Orange	Motors will not start.	
	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.	
B Yellow	If the Phantom flies into a special area in 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*.	
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*.	
D Blue	No restrictions.	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 will regain control once the motors have stopped. There is no need to toggle the S1 switch.

(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.

6.8 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.

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	×	×	×

Disclaimer

Please ensure that you are kept 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, violate or disregard any other applicable local laws, administrative rules and social habits thereof.

7 Assistant Installation and Configuration

7.1 Installing Driver and PHANTOM 2 Assistant

Installing and running on Windows

1. Download driver installer and Assistant installer in EXE format from the download page of PHANTOM 2 on the DJI website.
2. Connect the PHANTOM 2 to a PC via a Micro-USB cable.
3. Run the driver installer and follow the prompts to finish installation.
4. Next, run the Assistant installer and follow the prompts to finish installation.
5. Double click the PHANTOM 2 icon on your Windows desktop to launch the software.

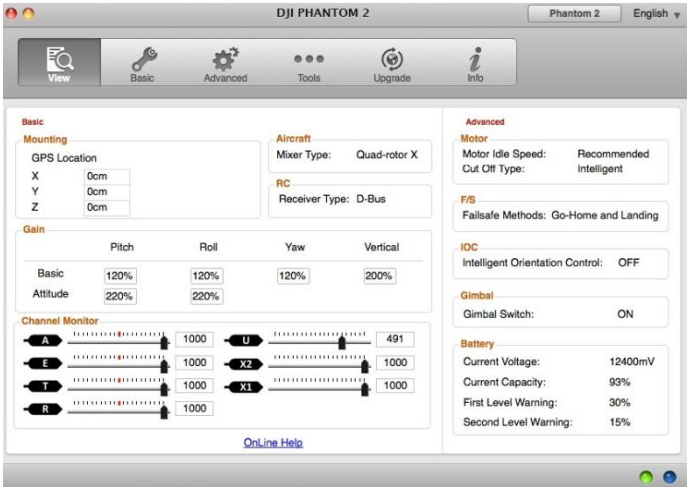
⚠ The installer in EXE format only supports Windows operating systems (Win XP, Win7, Win8 (32 or 64 bit)).

Installing and running on Mac OS X

1. Download the Assistant installer in DMG format from the download page of PHANTOM 2 on the DJI website.
2. Run the installer and follow the prompts to finish installation.

3. When launching for the first time if use Launchpad to run the PHANTOM 2 Assistant, Launchpad won't allow access because the software has not been reviewed by Mac App Store.

4. Locate the PHANTOM 2 icon in the Finder, press the Control key and then click the PHANTOM 2 icon (or right-click the PHANTOM 2 icon using a mouse). Choose Open from the shortcut menu, click open in the prompt dialog box and then software will launch.
5. After the first successful launch, directly launching of the software can be achieved by double-clicking the PHANTOM 2 icon in the Finder or using Launchpad.

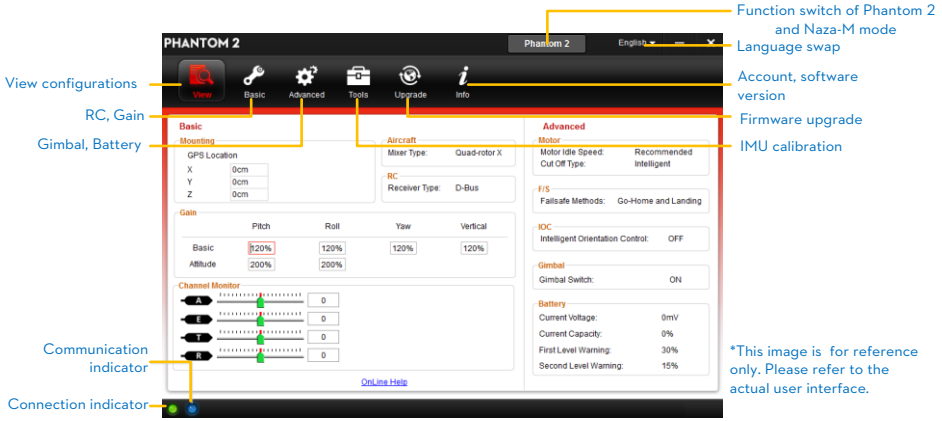


Installer in DMG format supports only Mac OS X 10.6 or above.

Usage of PHANTOM 2 Assistant on Mac OS X and Windows are exactly the same. The Assistant pages appear in other places of this manual are on the Windows for example.

7.2 Using the PHANTOM 2 Assistant on a PC

1. Start up the PC, power on the PHANTOM 2, then connect the PHANTOM 2 to the PC with a Micro-USB cable. DO NOT disconnect until configuration is finished.
2. Run the PHANTOM 2 Assistant and wait for the PHANTOM 2 to connect to the Assistant. Observe the indicators on the bottom of the screen. When connected successfully, the connection indicator is and communication indicator is blinking .
3. Choose [Basic] or [Advanced] configuration pages.
4. View and check the current configuration in the [View] page.



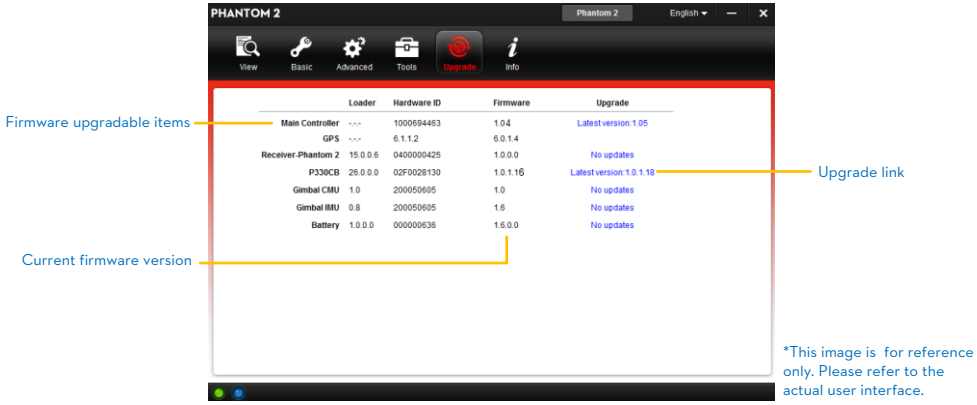
(1) Users should not enable the Naza-M function before finishing Advanced Flight Maneuvers procedure in the " PHANTOM Pilot Training Guide". If the Naza-M mode is enabled, users can switch the control mode between ATTI. Mode, GPS Mode or Manual Mode, and access the advanced settings (e.g. IOC). In addition, the LED located on the rear frame arms will display Naza-M flight status indications instead of the PHANTOM 2's indicators. Do not enable the Naza-M mode unless you are an experienced user or guided by a professional.

(2) You can change to the Phantom 2 mode by clicking the same button used to turn on the Naza-M mode. This operation will disable the Naza-M mode and enable Phantom 2 mode. All parameters will be returned to factory settings.

7.3 Firmware upgrade of PHANTOM 2

Please refer to the PHANTOM 2 Assistant to install driver and PHANTOM RC Assistant, and then follow the procedures below to upgrade the software and firmware; otherwise the PHANTOM 2 might not work properly.

1. An internet connection is required to upgrade PHANTOM 2's firmware.
2. Click the [Upgrade] icon to check the current firmware version and whether the installed firmware is the latest version. If not, click the relative links to upgrade.
3. Be sure to wait until the Assistant shows "finished". Click OK and power cycle the PHANTOM 2 after 5 seconds. Once completed, the firmware is up to date.



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

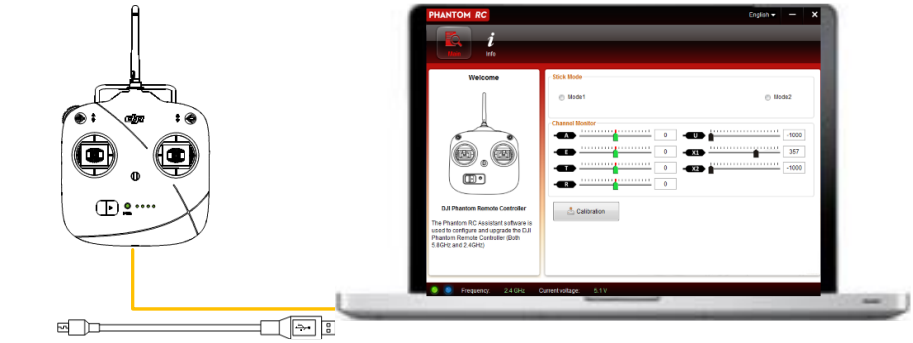
(2) If the firmware upgrade failed, the main controller will enter a waiting for firmware upgrade status automatically. If this happens, repeat the above procedures.

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

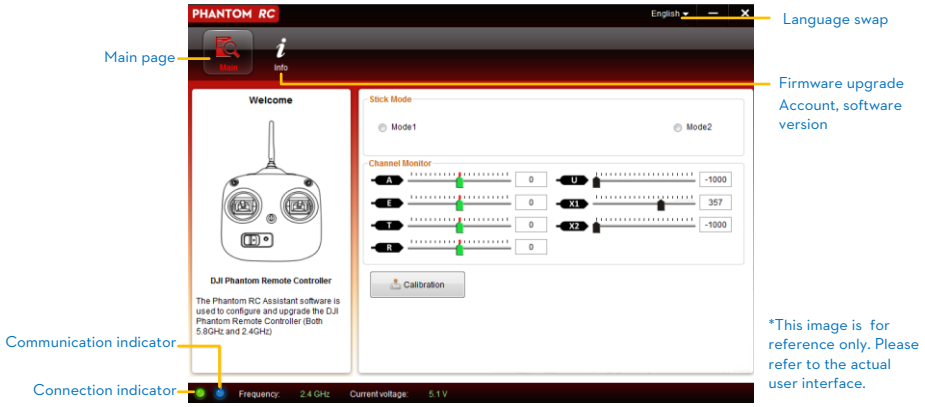
7.4 PHANTOM RC Assistant Description

Please follow the procedures to finish the configuration of the remote controller.

1. Turn off the remote controller and find the Micro-USB port on the bottom of it.
2. Start up the PC, power on the remote controller, and then connect the remote controller to the PC with a Micro-USB cable. DO NOT disconnect until the configuration is finished.
3. Run the PHANTOM RC Assistant and wait for the remote controller to connect to the Assistant. Observe the indicators on the bottom left of the screen. When connected successfully, the connection indicator is and communication indicator is blinking.
4. Finish configuration in the [Main] page.
5. Finish upgrade in the [Info] page if necessary.



Main Page of the 2.4GHz Remote Controller



8 Appendix

8.1 Specifications

Aircraft	
Operating environment temperature	-10℃ to 50℃
Power consumption	5.6W
Supported Battery	DJI Intelligent battery
Weight (including the battery)	1000g
Take-off Weight	≤1300g
Hovering Accuracy (Ready to Fly)	Vertical: 0.8m; Horizontal: 2.5m
Max Yaw Angular Velocity	200°/s
Max Tilt Angle	35°
Max Ascent / Descent Speed	Ascent: 6m/s; Descent: 2m/s
Max Flight Speed	15m/s (Not Recommended)
Wheelbase	350mm
2.4GHz Remote Controller	
Operating Frequency	2.4GHz ISM
Communication Distance (open area)	1000m
Receiver Sensitivity (1%PER)	-97dBm
Working Current/Voltage	120 mA@3.7V
Built-in LiPo Battery Working Current/Capacity	3.7V, 2000mAh
DJI Intelligent Battery	
Type	3S LiPo Battery
Capacity	5200mAh, 11.1V
Charging Environment Range	0℃ to 40℃
Discharging Environment Range	-20℃ to 50℃

8.2 LED Flight Indicators Description

Aircraft in Normal status	Descriptions
	Power On Self-Test
	Warming Up & Aircraft cannot take off during warming up
	Ready to Fly
	Ready to Fly (non-GPS)
Aircraft in abnormal status	**Warnings and errors**
	Remote Controller Signal Lost
	1st Level Low Battery Capacity Warning

	2nd Level Low Battery Capacity Warning
	Not Stationary or Sensor Bias is too big
	Errors & Aircraft cannot fly.*
	Compass data abnormal because of ferro-magnetic interference or the compass needs calibration.

* Users can connect to the PHANTOM 2 Assistant to get detailed information about warnings and errors.