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

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

September 21, 2015

Exemption No. 12945
Regulatory Docket No. FAA−2015-2554

Mr. Michael Bruk, Esq.
The Law Office of Michael Bruk
Counsel for Lappert Smith Technologies LLC
138 West 25th St, 10th Floor, Suite C1001
New York, NY 10001

Dear Mr. Bruk:

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 posted to the docket July 6, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Lappert Smith Technologies LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial imaging and inspection of power infrastructures.

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

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

Airworthiness Certification

The UAS proposed by the petitioner are the DJI S800 and DJI Inspire 1 .

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, Lappert Smith Technologies 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

[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.

aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Lappert Smith Technologies 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 S800 and DJI Inspire 1 when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

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

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

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

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

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

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating

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

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

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

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

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

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

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal

government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

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

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

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

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

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

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

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

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The

exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

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

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

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

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

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

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

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

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be

reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

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

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

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

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

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

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

Sincerely,

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

Enclosures

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, DC

Regulatory Docket No. _____

IN THE MATTER OF THE PETITION FOR EXEMPTION OF:
LAPPERT SMITH TECHNOLOGIES LLC
FOR AN EXEMPTION SEEKING RELIEF FROM THE REQUIREMENTS OF TITLE 14 OF THE CODE OF FEDERAL REGULATIONS SECTIONS 91.9(b), 91.203(a), 91.203(b), 45.23(b), 21.185, 45.27(a), 91.7(a), 91.103, 91.109(a), 91.119, 91.121, 91.151(a), 91.405(a), 91.407 (a)(1), 91.409 (a)(2), 91.147 (a), 91.147(b), and 61.113
CONCERNING OPERATION OF AN UNMANNED AIRCRAFT SYSTEM OVER RURAL AREAS OF THE UNITED STATES
PURSUANT TO SECTION 333 OF THE
FAA MODERNIZATION AND REFORM ACT OF 2012

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Contents

GLOSSARY OF ABBREVIATIONS

AGL Above Ground Level

ATC Air Traffic Control

COA Certificate of Authorization

FAA Federal Aviation Administration

FAR Federal Aviation Regulation

NAS National Airspace System

Section 333 FAA Modernization and Reform Act of 2012, Section 333

SMS Safety Management System

UAS Unmanned Aircraft System

VFR Visual Flight Rules

VMC Visual Meteorological Conditions

I. SUMMARY

Lappert Smith Technologies LLC, through its counsel and by this petition, seeks exemption that would permit Lappert Smith to operate an Unmanned Aircraft System ("UAS") over certain rural areas of the United States, while keeping the required regulatory documents readily accessible to the pilot in command at the ground control station. This exemption will also permit all required markings regarding the operational status of Lappert Smith's UAS to be displayed on the fuselage of the unmanned aircraft.

II. INTRODUCTION AND INTERESTS OF THE PETITIONER

Lappert Smith Technologies LLC (hereinafter referred to as ("Lappert Smith") seeks the requested exemptions to permit it to offer imaging and inspection of various power infrastructures to determine whether said lines are in need of repair. In addition, Lappert Smith seeks authority to conduct training and maintenance flights in a sterile area free from hazards and persons.

Various utility providers strive to deliver reliable resources to manufacturers, commercial enterprises, and residential customers. These utility constantly seek newer, more-efficient, cost-effective, and reliable means by which to perform safety checks of their equipment. These companies also realize that a portions of the infrastructure in the United States is aging and in need of repair or replacement. The Lappert Smith team has developed a remote piloted aerial system that safely and efficiently provides customers with low cost, comprehensive aerial inspection.

Lappert Smith acknowledges and appreciates that UAS operations are part of a complex and interconnected system that make up the national airspace (NAS). Lappert Smith personnel have extensive experience in conducting UAS flights and are conscious of the special safety issues that arise from working in this environment. The Lappert Smith Team is comprised as follows:

1. **Walter Lappert, Chief Design Engineer**. B.S. in Mechanic Engineering and A.A. in Unmanned Aircraft Technology; Community College of the Air Force degree in

Aircraft Armament Systems; 10+ years of USAF service, served as Weapons Load Team Chief, trained and qualified 51 service personnel on 18 GPS and laser-guided munitions system; Military Rank of Staff Sergeant (Disabled Veteran); Active SECRET Clearance (Department of Defense); 238 Missions with Objective; 750+ hours of UAS operation without objective. NCATT (National Center for Aerospace and Transportation Technology) Certified.

2. **Alex Hinkle, Lead Pilot-** B.S. in Aviation Management from Kansas State University; Pilot's License with Instrument Rating; Class 1 Medical; 178 Missions with objective, 250+ hours of UAS operation without objective

3. **Peter Kalaitzidis, Co-Pilot and Lead Observer-** A.A. in Applied Sciences; A.A. in Electrical Engineering, Community College of the Air Force degree in Aircraft Armament Systems; Military Rank of Staff Sergeant (Disabled Veteran, Retired); Class 2 Medical Clearance; 88 Missions with objective, 625+ hours of UAS operation without objective.

4. **Parker Freeman, Co-Pilot/Observer.** Private Pilot's License; Class 2 Medical Clearance; 2013 AUVSI (Association for Unmanned Vehicle Systems International) Safety Award Recipient; 50 UAS missions as PIC totaling 150 single engine PIC flight time hours; 120 UAS missions as co-pilot/observer.

5. **Bretten Smith- Chief Operating Officer.** B.S. in Applied Science and MBA with focus on Program Management, Kansas State University; Led Weapons System and Tech Crews in USAF; Military Rank of Staff Sergeant (Disabled Veteran); Active SECRET Clearance (Department of Defense).

III. BACKGROUND OF THE DJI S800 OCTOCOPTER

Lappert Smith seeks an exemption to operate a DJI S800 hexacopter UAS[1], for compensation or hire within the national airspace system ("NAS"). The DJI S800 hexacopter UAS is comprised of an amphibious unmanned aircraft and a transportable ground station. The DJI S800 hexacopter UAS has a maximum gross weight of approximately thirty (30) pounds, a 360 millimeters (14.173 inches) length of each wing, and base a length of 500 millimeters (19.685 inches). The DJI S800 hexacopter unmanned aircraft is equipped with 6 propellers driven by a Lithium Polymer battery powered electric motor.

IV. BASIS FOR APPROVAL OF LAPPERT SMITH PETITION

Petitioner, Lappert Smith, through its undersigned counsel and pursuant to the provisions of the Federal Aviation Regulations (14 C.F.R. § 11.61) and the FAA Modernization and Reform Act of 2012, Section 333, *Special Rules for Certain Unmanned Aircraft Systems*, hereby petitions the Administrator for an exemption from the requirements of 14 C.F.R. §§ 91.9(b), 91.203(a), 91.203(b), 45.23(b).

In the alternative, and in accordance with Federal Aviation Regulation ("FAR") Section 21.16, entitled *Special Conditions* (14 C.F.R. § 21.16), Lappert Smith respectfully requests that the Administrator prescribe special conditions for the intended operation of the Lappert Smith DJI S800 hexacopter UAS that contain such safety standards as the Administrator finds necessary to establish a level of safety equivalent to that established by the restricted category airworthiness certification standards specified in 14 C.F.R. § 21.185. Lappert Smith provides the following information in support of its petition for exemption:

Name And Address Of The Petitioner.

Lappert Smith Technologies LLC
1205 S. Tryon St. Unit 1106
Charlotte, NC 28203

[1] Lappert Smith has reserved registration numbers N 810LS, 482LS, 474LS, and 326LS and will submit an Aircraft Registration Application upon the grant of the exemptions sought by this Petition.

The point of contact for this Petition and specific contact information is as follows:

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Email: mb@bruklaw.com

A. Approval is Warranted Based on the UAS's Size, Weight, Speed, and Operational Capability

Lappert Smith will employ the DJI S800 hexacopter for infrastructure inspection operations, with a maximum take-off weight of 30 pounds, and whose flight speed will not exceed 30 miles per hour. In addition, no UAS will be flown in controlled airspace absent written consent of a local regulatory agency or office, nor at an altitude that exceeds 400 feet AGL, and in such a way that operations can be safely terminated with a reserve battery power of 30% maximum charge. The DJI S800 does not carry any flammable propellant or fuel and possesses redundant motor capabilities. In addition, the UAS can maintain flight in the event one or more motors fail unexpectedly, and is capable of compensating for engine loss automatically. The DJI S800 also possesses the ability to alert the PIC to the possibility of a lost link before it occurs. In the event a control link is unexpectedly lost, the UAS is equipped with failsafe setting which returns the vehicle to a pre-determined, emergency alternate landing zone.

In the absence of UAS operations, and particularly in rural areas, many of these inspections would have to be carried out by a helicopter or by technicians performing the

inspection manually. Helicopter inspections are carried out at high speed, and carry a greater risk of a wire strike or other collision than do UAS operations. Moreover, conducting helicopter inspections at certain locations, such as substations where several utility lines converge, carry additional risks to helicopters. Finally, due to the low altitude of utility line inspection flights, the ability of a helicopter pilot to successfully conduct an autorotation in the event of an engine failure may be limited or impossible. Given the small size of the selected UAS and the restricted environment within which it will operate, this petition for exemption falls within the equivalent level of safety which Congress directed the FAA to permit commercial UAS operations by exemption pending completion of formal rulemaking.

B. Approval is Warranted Based on the Operational Restrictions Set Forth in the Operations Manual

The Lappert Smith Operations Manual, along with the DJI manufacturer's manual, contain all of the procedures and limitations necessary to successfully and safely perform inspections of infrastructure. Below is a summary of operational limitations and conditions which will ensure an equivalent or higher level of safety for operations conducted under current regulatory guidelines:

1. The UAS will weigh 30 pounds or less.
2. Flights will be operated within line of sight of a pilot and observer.
3. Maximum total flight time for each operational flight will be limited to the lesser of 25 to 30 minutes or the amount of time the UAS can be flown and still maintain a reserve battery power of no less than 30%.
4. Flights will be operated at an altitude of no more than 400 feet AGL and will not be conducted within navigable airspace.
5. Flights will be operated at a lateral distance of least 500 feet from any inhabited structures, buildings, vehicles or vessels, or from people not associated with the operation who have not given permission in advance of the operation.

6. Minimum crew for each operation will consist of the UAS Pilot, one or more Visual Observers as necessary to safely conduct the mission, and a Sensor Operator if required, all of whom possess class 2 Medical
7. The Pilot will have a private pilot's license, be instrument rated, and have completed 64 hours of training and instruction on the DJI 800 prior to any flight in accordance the Operations Manual, will have conducted at least three (3) take-offs and three (3) landings 90 days immediately preceding the date of any proposed commercial operation.
8. The UAS will operate in accordance with the safety and operational requirements of the Operations Manual.
9. Prior to the operation, a Mission Plan will be created setting forth the limitations for the flight as well as contact and hazard information provided by the utility.
10. A NOT AM will be issued not more than seventy-two (72) hours in advance of flight, but not less than twelve (12) hours before flight.
11. Pilot, Visual Observer and Sensor Operator will at all times be able to communicate by voice.
12. Prior to any flights, a Certificate of Authorization will be obtained specifying the geographic over which operations will be conducted.
13. All required permissions and permits will be obtained from territorial, state, county or city jurisdictions, including local law enforcement, fire or other appropriate governmental agencies.
14. The operator will coordinate all flights with the appropriate Flight Standards District Office.
15. If the UAS loses communications or loses its GPS signal, the UAS will have the capability to return to a pre-determined location within the operational area and land.
16. Contingency plans will be in place to safely terminate flight if there is a loss of communication between the pilot and the observer.
17. The UAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.
18. The DJI S800 UAS shall be operated pursuant to Day Visual Flight Rules (VFR) in visual meteorological conditions (VMC). The DJI S800 UAS shall be operated only during daylight hours (*i.e.* between the end of morning civil twilight and the beginning of

evening civil twilight, as published in the American Air Almanac, converted to local time).

19. The DJI S800 UAS shall operate from on-site takeoff/landing locations directly next to the pilot in command and co-located safety observer. If the operation is from a watercraft, the pilot in command and safety observer shall remain co-located on the same watercraft.
20. Operation of the DJI S800 UAS with any inoperative instruments or equipment shall be prohibited.
21. The DJI S800 UAS shall be maintained in accordance with the Manufacturer's Maintenance Manual.
22. The DJI S800 UAS shall be operated pursuant to 14 C.F.R. Part 91, operating requirements.
23. For the proposed flight operation, only one DJI S800 UAS shall be airborne at any given time.
24. Prior to flight operations, Lappert Smith shall coordinate and establish two way communications with the nearest Air Traffic Control facility.
25. For any flight operations over U.S. Government or state managed lands, Lappert Smith shall coordinate with the appropriate authority and ensure that the property owners have at least twelve (12) hours of advance notice prior to the proposed flight operations. Coordination shall include anticipated periods of operation, purpose of the flights, and contact information for the operator should questions or issues arise.

V. THE EXTENT OF RELIEF LAPPERT SMITH SEEKS AND THE REASON LAPPERT SMITH SEEKS THE RELIEF.

A. Relief From Section 91.9(b).

Lappert Smith seeks an exemption from **14 C.F.R. § 91.9(b).** Section 91.9, *Civil aircraft flight manual, marking, and placard requirements*, of which subsection (b) states:

(b) No person may operate a U.S.-registered civil aircraft (1) for which an Airplane or Rotorcraft Flight Manual is required by § 21.5 of this chapter unless there is available in the

aircraft a current, approved Airplane or Rotorcraft Flight Manual or the manual provided for in § 121.141(b); and (2) For which an Airplane or Rotorcraft Flight Manual is not required by § 21.5 of this chapter, unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

Equivalent Level of Compliance

The DJI S800 hexacopter UAS is unmanned and has a maximum gross weight of approximately thirty (30) pounds. Therefore, it is unable to carry Airplane Flight Manuals onboard. Lappert Smith proposes the following conditions and limitations to its request for exemption from Section 91.9(b):

The approved Airplane Flight Manual shall be kept at the ground control station, immediately available for reference by the PIC, or inspection by any FAA, DOD, or other law enforcement official, any time during operation of the UAS. In addition, the Flight Manual shall be made available within 10 days to any law enforcement official upon request.

B. Relief From Section 91.203(a) and (b).

Lappert Smith seeks an exemption from **14 C.F.R. § 91.203(a) and (b).** Section 91.203 entitled *Civil aircraft: Certifications required*, subsections (a) and (b) state the following:

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

(1) An appropriate and current airworthiness certificate. Each U.S. airworthiness certificate used to comply with this subparagraph (except a special flight permit, a copy of the applicable operations specifications issued under § 21.197(c) of this chapter, appropriate sections of the air carrier manual required by parts 121 and 135 of this chapter containing that portion of the operations specifications issued under §

21.197(c), or an authorization under § 91.611) must have on it the registration number assigned to the aircraft under part 47 of this chapter. *However*, the airworthiness certificate need not have on it an assigned special identification number before 10 days after that number is first affixed to the aircraft. A revised airworthiness certificate having on it an assigned special identification number, that has been affixed to an aircraft, may only be obtained upon application to an FAA Flight Standards district office.

(2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft registration Application as provided for in § 47.31(c), or a registration certification issued under the laws of a foreign country.

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

Equivalent Level of Compliance

The DJI S800 hexacopter is unmanned, has no cabin, cockpit, pilot station, or other entrances. The aircrew is located at the ground control station and no passengers are carried at any time. Lappert Smith proposes the following conditions and limitations to its request for exemption from Sections 91.203(a) and (b):

The documents required by §§ 91.203(a) and (b) shall be kept at the ground control station, immediately available for reference by the PIC, or inspection by any FAA, DOD, or other law enforcement official, any time during operation of the UAS. In addition, these documents shall be made available within 10 days to any law enforcement official upon request.

C. Relief From 14 C.F.R. § 45.23(b).

Lappert Smith seeks an exemption from **14 C.F.R. § 45.23(b)**. Section 45.23 entitled *Display of marks; general*, subsection (b), states the following:

(b) 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.

Equivalent Level of Compliance

As the DJI S800 hexacopter UAS is unmanned, it has no cabin, cockpit, pilot station, or entrances thereto. Therefore, Lappert Smith proposes that, the FAA N numbers be prominently displayed on DJI 800 be displayed prominently displayed on the fuselage with markings that are as large as practicable., on both sides of the DJI S800 hexacopter UAS.

D. Relief From 14 C.F.R. Part 21, Subpart H- Airworthiness Certificates and 14 C.F.R. §91.203(a)(1)

Lappert Smith respectfully requests the FAA finds, under the Reform Act, that the DJI S800 UAS provides a level of safety equivalent to that of aircraft normally used for the same application. If such a finding is made, no exemption is needed. If, however, the FAA determines that there any characteristics of the UAS fail to meet the requirements of the Reform Act, an exemption is requested.

Equivalent Level of Compliance

The DJI S800 UAS will operate safely taking into account its size, weight, speed, and operational capability. The UAS has a maximum take-off weight of 30 pounds, will be flown at less than 30 miles per hour and completely outside controlled airspace.

Utility line inspections are currently performed by helicopters, which weigh thousands of pounds, carry large loads of fuel, and do not possess the ability to compensate for unexpected engine failure. Taken together with the low altitudes needed to conduct these inspections, helicopters cannot conduct operations as safely as a UAS. In addition, damage to critical infrastructure resulting from a helicopters coming into contact with a utility line or substation is far greater than if that of a small UAS. Thus, a UAS operated in a restricted environment, within line-of-sight of the PIC, and under the conditions proposed, will be at least as safe as a conventional rotorcraft operating.

E. Relief From 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft

14 C.F.R. Part 27 sets forth the procedural requirements for airworthiness certification of normal category rotorcraft. To the extent the Petitioner's UAS would otherwise require certification under Part 27, Petitioner seeks an exemption from Part 27's airworthiness standards for the same reasons identified in the exemption request from 14 C.F.R. Part 21, Subpart H.

F. Relief From 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a): Aircraft Marking and Identification Requirements

Petitioner Lappert Smith seeks an exemption from the aircraft marking and identification requirements contained in 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a). • 14 C.P.R.§ 91.9(c), Civil Aircraft Flight Manual, Marking and Placard requirements, provides that: No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with Part 45 of this chapter.

> 14 C.F.R. § 45.23(b), Markings of the Aircraft, states: 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. • 14

C.F.R. § 45.27(a), Rotorcraft, states: Each operator of a rotorcraft must display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by§ 45.23.

Equivalent Level of Safety

As the DJI 800 is a hexacopter with an unconventional shape, Lappert Smith will apply for a Letter of Alternative Marking to allow the registered N-number to be prominently displayed on the fuselage with markings that are as large as practicable.

G. Relief From 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft and 14 C.F.R. § 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration

Pursuant to 14 C.F.R. § 91.9(b)(2):

(b) 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 ofthis 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. Pursuant to 14 C.F.R. § 91.203(a) and (b):(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 (a) of this section or a special flight authorization issued under § 91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

Equivalent Level of Compliance

Lappert Smith does not request an exemption from this section but instead notifies the FAA that, in accordance with FAA Office of Chief Counsel's Opinion dated August 8, 2014, the

UAS flight manual, registration certificate and other documentation will be kept at the control station with the PIC during flight. The Chief Counsel's Office has held that for all UAS operations, this alternate method constitutes full compliance with the regulations.

H. Relief From 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness

Petitioner seeks an exemption from 14 C.F.R. § 91.7(a), which requires that a civil aircraft be in airworthy condition to be operated. The FAA has stated that no exemption is required to the extent that the requirements of Part 21 are waived or found inapplicable. Accordingly, Petitioner request that the requirements for Section 91.7 are treated in accordance with Section V(A), supra.

I. Relief From 14 C.F.R. § 91.103: Preflight Action

Petitioner seeks an exemption from 14 C.F .R. § 91.103, which requires a PIC to become familiar with specific information before each flight, including information contained in the FAA-approved Flight Manual on board the aircraft. While the PIC will be familiar with all information necessary to safely conduct the flight, an exemption is requested to the extent that an FAA-approved Flight manual is required.

Equivalent Level of Compliance

An equivalent level of safety will be provided by following the Aircraft Operations Manual and flight manual provided by the manufacturer. The PIC will take all required preflight actions- including performing all required checklists and reviewing weather, flight battery requirements, landing and takeoff distance, aircraft performance data, and contingency landing areas - before initiation of flight. The Aircraft Operations Manual and manufacturer's flight manual will be kept at the ground station with the operator at all times.

J. Relief From 14 C.F.R. § 91.109(a): Flight Instruction

Petitioner seeks an exemption from 14 C.F.R. § 91.109(a), which provides that "[n]o 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." UASs and remotely piloted aircraft, by their design, do not have functional dual controls. Instead, flight control is accomplished through the use of a device that communicates with the aircraft via radio communications.

Equivalent Level of Compliance

Given the size and speed of the UAS, an equivalent level of safe training can still be performed without dual controls because no pilot or passengers are aboard the UAS, and all persons will be a safe distance away in the event that the UAS experiences any difficulties during flight instruction. In addition, Petitioner has established a flight training program that will be administered by a certified flight instructor. That training program includes both classroom instruction as well as supervised flight training employing the same aircraft that will be used operationally to conduct power infrastructure inspections. Accordingly, Lappert Smith's proposed method of operation provides superior levels of safety.

K. Relief From 14 C.F.R. § 91.119: Minimum Safe Altitudes

Petitioner requests an exemption from the minimum safe altitude requirements of 14 C.F.R. § 91.119. Section 91.119 prescribes the minimum safe altitudes under which aircraft may not operate, including 500 feet above the surface and away from any person, vessel, vehicle, or structure in non-congested areas. *See* 14 C.F .R. *§* 91.119(c). Section 91.119(d) allows for a helicopter to operate at less than those minimum altitudes when it can be operated "without hazard to persons or property on the surface," provided that "each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA."

Equivalent Level of Compliance

Compared to flight operations with rotorcraft weighing far more than the maximum UAS weight proposed herein, and given the lack of flammable fuel, any risk associated with these operations is far less than those that presently exist with conventional aircraft. An equivalent level of safety will be achieved given the size, weight, and speed of the UAS, as well as the location where it is operated. In order to avoid any risk to aircraft, flight operations will be restricted to 400' AGL or below. As set forth in the Manual, the UAS will be operated in a restricted area, away from persons or structures not involved in the operation.

L. Relief From 14 C.F.R. § 91.121: Altimeter Settings

This petition seeks an exemption from 14 C.P.R.§ 91.121, which requires a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to the elevation of the departure airport or barometric pressure. An exemption is required to the extent that the UAS does not have a barometric altimeter, but rather a GPS altitude read out.

Equivalent Level of Compliance

The FAA has stated that an equivalent level of safety can be achieved if the UAS will be operated at 400' or below and within visual line-of-sight in addition to GPS based altitude information relayed in real time to the operator. As the attached Operations Manual indicates, the chosen UAS meets these requirements, and a zero altitude initiation point will be obtained prior to flight.

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

Petitioner requests an exemption from 14 C.P.R.§ 91.151(a)'s fuel requirements for flight in VFR conditions. Section 91.151 states:

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

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

(2) At night, to fly after that for at least 45 minutes.

Equivalent Level of Compliance

Here, the technological limitations on UAS battery power means that no meaningful flight operations can be conducted while still maintaining a 30 minute reserve. The FAA has stated that an equivalent level of safety is provided if the UAS flight is terminated with at least 25% reserve battery power still available. Lappert Smith proposes that all flights comply with this requirement by mandating that the aircraft be safely landed with no less than 30% of battery life remaining.

N. Relief From 14 C.F.R. § 91.405(a), 91.407(a)(l), 91.409(a)(2); 91.417(a) and (b): Maintenance Inspections

Petitioner seeks an exemption from the maintenance inspection requirements contained in 14 C.F.R. § 91.405(a), 91.407(a)(l), 91.409(a)(2); 91.417(a) and (b). These regulations specify maintenance and inspection standards in reference to 14 C.F.R. Part 43. *See, e.g.,* 14 C.F.R. § 91.405(a) (stating that each owner or operator of an aircraft "[s]hall have the aircraft inspected as prescribed in subpart E of this part and shall between required inspections ... have discrepancies repaired as prescribed in part 43 of this chapter"). An exemption to these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the UAS will not have.

Equivalent Level of Compliance

An equivalent level of safety will be achieved because maintenance and inspections will be performed in accordance with the UAS Manufacturer's Manual, as referenced in the Operations Manual. As provided in the Operat ons Manual, flights will not be conducted unless a flight operations checklist is performed that includes all of the aircraft's components. The Operations Manual also sets requirements for maintenance log books and record keeping as well as routine and post-flight maintenance. The Manual sets requirements for both annual maintenance and preventative maintenance based on hours of flight.

O. Relief From 14 CFR § 61.113: Private Pilot Privileges And Limitations

Petitioner seeks exemption from 14 CFR § 61.113, which restricts private pilot certificate holders from flying aircraft for compensation or hire, and would also require a second class medical certificate. The purpose of Part 61 is to ensure the skill and competency of any PIC matches the airspace in which the PIC will be operating, as well as requiring certifications if the private pilot carries passengers or cargo for hire. In this case, while the UAS will be operated as part of a commercial operation, it carries neither passengers nor cargo. In the Grant of Exemption in FAA Docket No. FAA-2014-0352, the FAA determined that the unique characteristics of UAS operation outside of controlled airspace did not warrant the addition cost and restrictions attendant with requiring a PIC to have a commercial pilot certificate and class II medical certificate.

Equivalent Level of Compliance

Regardless, Lappert Smith will employ only licensed private pilots as PIC for their operation. The restrictions Lappert Smith has placed on its UAS operations meet or exceed the restrictions similarly imposed on Astraeus Aerial in FAA Docket No. F AA-2014-0352. Lappert Smith will operate in a sterile area way from persons and property not involved in the inspection. It will be flown based on VLOS and below 400' AGL. A NOT AM will be issued between 12 and 72 hours before the flight is to occur, and the flight will be coordinated with the applicable FSDO.

VI. DRUG AND ALCOHOL PROGRAM

Lappert Smith is committed to a drug-free work place and the right of the flying public it serves to safe and efficient air transportation. All employees of Lappert Smith who perform safety sensitive and/or security related functions are prohibited from performing work if they have alcohol or a prohibited drug in their system.

VII. REASONS WHY GRANTING LAPPERT SMITH'S REQUEST WOULD BE IN THE PUBLIC INTEREST

Lappert Smith submits this Petition to provide safe, efficient, and economical aerial inspection and research throughout rural areas of the United States, in support of government entities, agriculture, scientific studies, wildlife monitoring, forestry, the oil and gas industries, and other utilities and commercial operations that require aerial inspection. The specific operations that Lappert Smith will perform with the DJI S800 hexacopter UAS demonstrate how the requested exemption will directly benefit these industries, as well as the public.

A. The Public Will Benefit From Decreased Congestion Of The NAS, Reduced Noise and Air Pollution, and Safety of Life and Property, and Air Traffic Control's Responsibilities

Compared to the cabin class, six-cylinder internal combustion twin engine aircraft that that use 20-30 gallons per hour of leaded aviation fuel, the DJI S800 hexacopter UAS uses battery power and an electric motors, which produce no air pollution, thereby reducing the carbon footprint of aerial inspections and eliminating noise pollution. The DJI S800 motor is barely audible during take-off, and cannot be heard when operating more than 100 feet above ground level. The DJI S800 hexacopter UAS is a safe, efficient, and economical alternative to the manned aircraft traditionally utilized to obtain aerial imagery.

The DJI S800 hexacopter UAS, which weighs approximately thirty (30) pounds at its maximum gross weight, a 360 millimeter (14.173 inch) length of each wing, and base a length of 500 millimeters (19.685 inches) and has no fuel on board. Thus, the potential for collateral damage to life and property on the ground, and in the air, compared to the manned aircraft that typically conduct aerial inspection will be substantially reduced or completely eliminated.

An exemption allowing the use of a DJI S800 hexacopter UAS would decrease NAS congestion and provide a substantial benefit to the public in the form of reduced quantity and size of manned aircraft, reduce noise and air pollution, increase the safety of life and property in the air and on the ground, and reduce air traffic control's responsibilities regarding ground, takeoff, departure, arrival, and landing phases of flight operations.

B. Aerial Inspections with the DJI S800 Hexacopter UAS will Benefit the Economy

With the rising cost of aviation fuel and the EPA actions phasing out leaded fuels, U.S. companies are searching for alternative technology to remain competitive. The DJI S800 hexacopter UAS is an economically sound alternative to manned aircraft and will allow U.S.-based companies to remain competitive, provide greater job stability to employees and contractors, and ultimately contribute to the growth of the U.S. economy.

Improved financial performance of U.S. companies, through commercial use of the DJI S800 hexacopter UAS, provides a stable workforce that increases consumer spending, thereby increasing tax revenues for local, state, and federal governments,

C. No Privacy Issues Exists

The DJI S800 hexacopter UAS will operate only in rural areas, and in accordance with all Federal Aviation Regulations, including the minimum altitude requirements of 14 C.F.R. § 91.119. In addition, the DJI S800 hexacopter UAS will not be operated closer than 500 feet to any third-person, vessel, vehicle, or structure, except when necessary for takeoff or landing.

VIII. OPERATIONS AND MANUFACTURER'S MANUALS

A copy of the Lappert Smith's Operations Manual and DJI's Manufacturers Manual, which are proprietary information, are attached hereto as Exhibits A and B, Petitioner requests, pursuant to 14 C.F.R. § 11.35(b), that all Exhibits attached to petition be held in a separate file as they are proprietary information, and in accordance with 14 C.F.R. 11.35(b), are not to be included in the Federal Docket Management System (FDMS).

IX. Any Other Conditions The FAA May Prescribe For Safe Operation.

In accordance with Section 333 of the FAA Modernization and Reform Act of 2012 and 14 C.F.R. § 21.16 entitled *Special Conditions*, Lappert Smith requests that the FAA prescribe special conditions for the intended operation of the DJI S800 UAS, which contain such safety standards that the Administrator finds necessary to establish a level of safety equivalent to that established by Section 21.185, and which will permit safe operation of the DJI S800 UAS for the special purpose of conducting aerial inspection over rural areas of the United States. Section 333 sets forth the requirements for considering whether a UAS will create a hazard to users of the NAS or the public, or otherwise pose a threat to national security; and further, provides the authority for such UAS to operate without airworthiness certification in accordance with any requirements that must be established for the safe operation of the aircraft systems in the NAS.

Likewise, the Administrator may prescribe special conditions pursuant to 14 C.F.R. § 21.16, for operation of the DJI S800 UAS, since the airworthiness regulations of 14 C.F.R. Part 21 do not contain adequate or appropriate safety standards, due to the novel or unusual design features of the aircraft. Section 21.16, entitled *Special Conditions*, states the following:

> "If the FAA finds that the airworthiness regulations of this subchapter do not contain adequate or appropriate safety standards for an aircraft, aircraft engine, or propeller because of a novel or unusual design feature of the aircraft, aircraft engine or propeller, he prescribes special conditions and amendments thereto for the product. The special

conditions are issued in accordance with Part 11 of this chapter and contain such safety standards for the aircraft, aircraft engine or propeller as the FAA finds necessary to establish a level of safety equivalent to that established in the regulations."

Therefore, in accordance with Section 333 and 14 C.F.R. § 21.16, the FAA may prescribe special conditions for Lappert Smith's intended operation of the DJI S800 UAS, which contain such safety standards that the Administrator finds necessary to establish a level of safety equivalent to that established by Section 21.185, and which will permit safe operation of the DJI S800 UAS for the special purpose of conducting aerial inspection over rural areas of the United States.

X. A Summary That Can Be Published In The *Federal Register*, stating: The Rules From Which Lappert Smith Seeks Exemption:

Lappert Smith Technologies LLC seeks exemption from the requirements of 14 C.F.R. §§ 91.9(b), 91.203(a), 91.203(b), 45.23(b), 21.185, 45.27(a), 91.7(a), 91.103, 91.109(a), 91.119, 91.121, 91.151(a), 91.405(a), 91.407 (a)(1), 91.409 (a)(2), 91.147 (a), 91.147(b), and 61.113

A Brief Description Of The Nature Of The Exemption Lappert Smith Seeks:

This exemption will permit Lappert Smith to operate an Unmanned Aircraft System over certain rural areas of the United States, while keeping the documents required by the regulations at the ground control station and immediately accessible to the pilot in command. Furthermore, the exemption will relieve Lappert Smith from the airworthiness certificate standards and the requirement to have a certificate of airworthiness for its Unmanned Aircraft System. This exemption will also permit any required markings concerning the operational status of the UAS to be displayed on the fuselage of the unmanned aircraft.

XI. CONCLUSION

As set forth above, Lappert Smith seeks an exemption pursuant to 14 C.F.R. § 11.61 and Section 333 of the FAA Modernization and Reform Act of 2012, which will permit safe operation of the DJI S800 UAS commercially, for the special purpose of conducting aerial inspections over certain rural areas in the United States. By granting this Petition, the FAA Administrator will be fulfilling the Congressional mandate of the FAA Modernization and Reform Act of 2012, while also advancing the interests of the public, by allowing Lappert Smith to safely, efficiently, and economically operate the DJI S800 UAS commercially within the NAS.

WHEREFORE, in accordance with the Federal Aviation Regulations and the FAA Modernization and Reform Act of 2012, Section 333, Lappert Smith respectfully requests that the Administrator grant this Petition for an exemption from the requirements 14 C.F.R. §§ 91.9(b), 91.203(a), 91.203(b), 45.23(b), 21.185, 45.27(a), 91.7(a), 91.103, 91.109(a), 91.119, 91.121, 91.151(a), 91.405(a), 91.407 (a)(1), 91.409 (a)(2), 91.147 (a), 91.147(b), and 61.113

Dated: New York, New York
June 5, 2015

Respectfully submitted,

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Attorney for Petitioner,
Lappert Smith Technologies LLC

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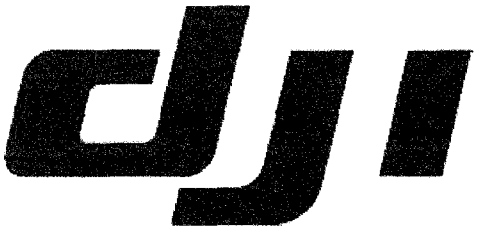
Spreading Wings S800

User Manual

V 1.7

2012.12.24 Revision



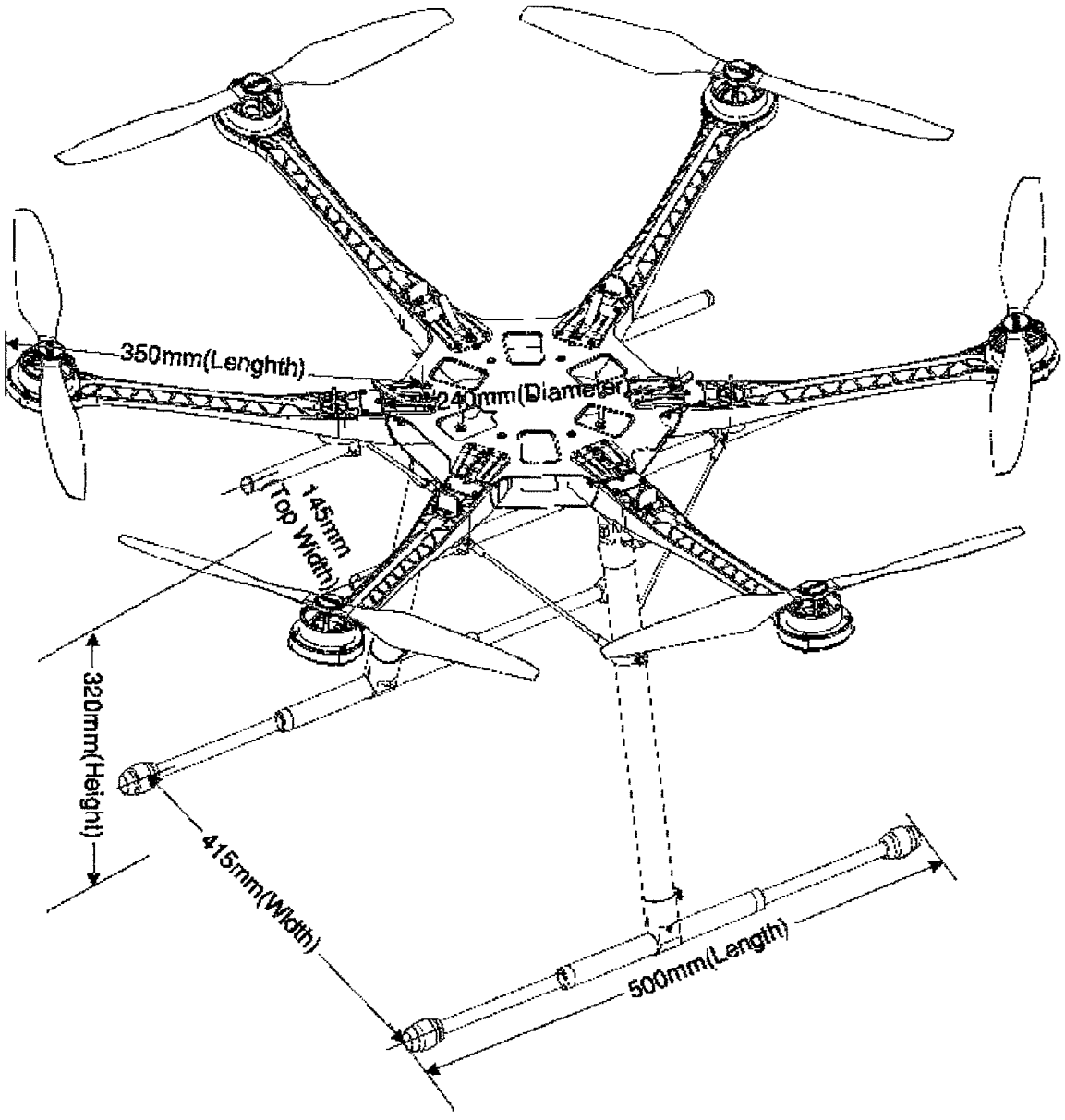
Disclaimer

Read this disclaimer carefully before using Spreading Wings S800. By using this product, you hereby agree to this disclaimer and signify that you have read them fully. Spreading Wings S800 is an excellent multi-rotor. With a good autopilot, it will offer tremendous flight features. Despite the controller of DJI autopilot operate in the safest manner when the main power battery is connected, we strongly recommend customers to remove all frame arms, and keep children away during system calibration and parameter setup.

As DJI Innovations has no control over use, setup, final assembly, modification (including use of non-specified DJI parts i.e. motors, ESCs, propellers, etc.) or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.
DJI Innovations assumes no liability for damage(s) or injuries incurred directly or indirectly from this product usage.

S800 Profile

DJI Spreading Wings S800 is a multi-rotor designed for AP. It simplifies users' installation and enables quick disassembling. Frame arm integrates with ESC and motor. With DJI WKM autopilot system, it can achieve hovering, cruising and other flight elements. S800 can be applied for aerial photography and other aero-modeling activities.



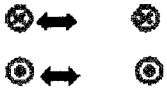
Contents

Product Usage Cautions

When flying, the fast rotating propellers of S800 may cause serious damage(s) and injuries. Therefore, please fly with a high safety in mind at all time.

Mount Attention

- Mount GPS with a bracket, to avoid interference from the power board of center frame.
- For IMU position, make sure the arrow direction marking is pointing to the aircraft nose.
- The receiver is recommended strongly to be installed under the bottom board of center frame, and the head of antenna is downward without any obstacle. The aircraft will be out of control, since the wireless signal may be lost by the obstacle.
- Mount the arms correctly.



Center frame ArmCenter frame Arm

- For removing screws in the bottom board, please proceed with cautious, avoiding damages. Do not remove any other screws fixed with glue.
- Notice matching the indications is very important, please pay attention to them.

Flight Attention

- With DJI WKM autopilot system, make sure the output signal of WKM F1~F2 and M1~M6 are all normal, to avoid serious damage(s) and injuries.
- Keep flying multi-rotor a distance from people, building, high-voltage lines, etc.
- Make sure to use 6S LiPo power battery.
- Do not get close to or touch the working motors and propellers, which will cause serious injury.
- Do not over load the multi-rotor.
- Make sure the propellers and the motors are installed correctly and firmly before flying.
- Make sure all parts of S800 are in good condition before each flight. Do not fly with wore or broken parts.
- Strongly recommend you use DJI parts as much as possible.

Others

- If you have any problem you cannot solve, please contact agents or DJI customer service.

In Box

Center Frame 800CFx1	**Frame Arm 800FAx6**	
H Frame 800HF x1	**T Frame 800TFx2,Aluminum Ring 800ARx2**	
Base Pipe 800BPx2	**Bi-pod Drawbar 800BDx4**	
Silicone Rubber Damper 800SRDx4	**Nonslip Damper 800NDx4**	
3-PIN Servo Cable 800SC x1	**Screw Package 800SP x1**	
	Hexagonal screws: M3×8、M2.5×5	
	Hexagonal socket head cap screws: HC-M3.0×22	
	HC-M2.5×5、HC-M2.5×8 HC-M3×8、T2×9	

Adhesive Velcro 800AV x1, Battery Band 800BB x2

Tools Needed

2.0mm Hex Wrench, 2.5mm Hex Wrench For mounting screws.

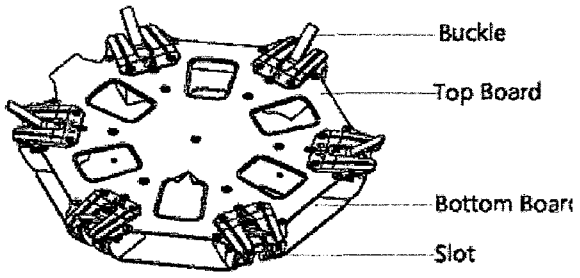
Screw Glue For fastening screws.

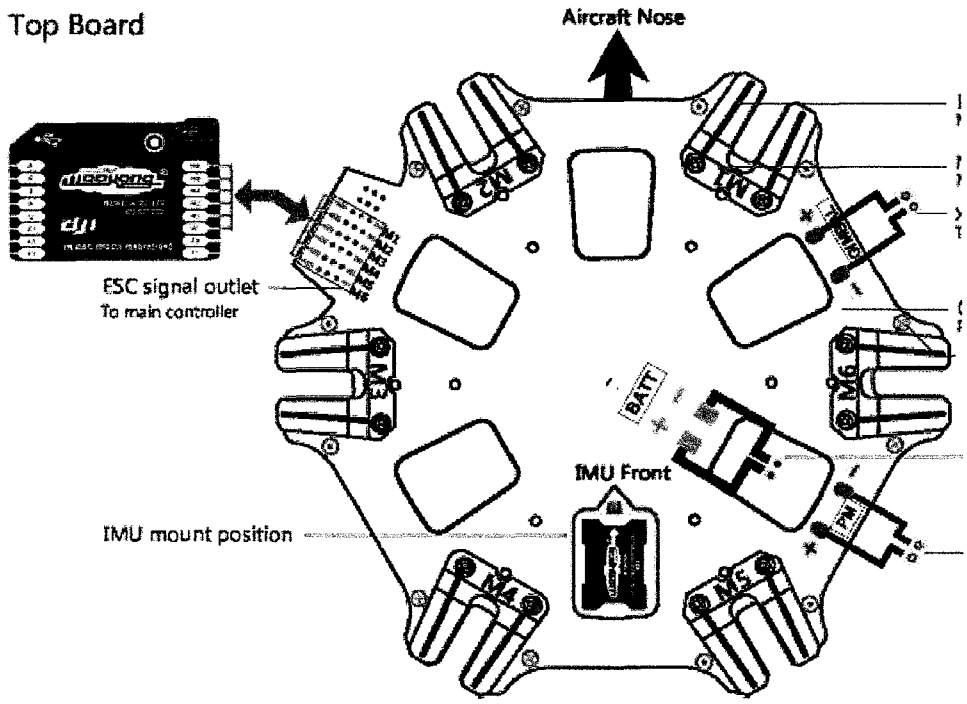
Nylon Cable Tie	
Scissors	For binding devices and wires.
Diagonal Cutting Pliers	

Foam Double Sided Adhesive Tape For fixing receiver, controller and other modules.

Center Frame Wiring

Top board is power distribution board, and the bottom board is for loading autopilot system components.





Notices:

- For IMU position, make sure the arrow irection marking is pointing to the aircraft nose.

  T_{op} Board Moor number

- Connect the motor 3-pin connector (M1~M6) from WKM M.C. to ESC signal socket (M1~M6) on

  To imbal

  C signal outlet
  center frame markings accordingly.

  Botto

  (WKM M.C. M1 ESC signal scket M1, , WKM M.C. M6 ESC signal socket M6)

  Slot

  Mak

- **Tips:** Main battery power leads, gimbal and PMU leads are on the bottom surface of the

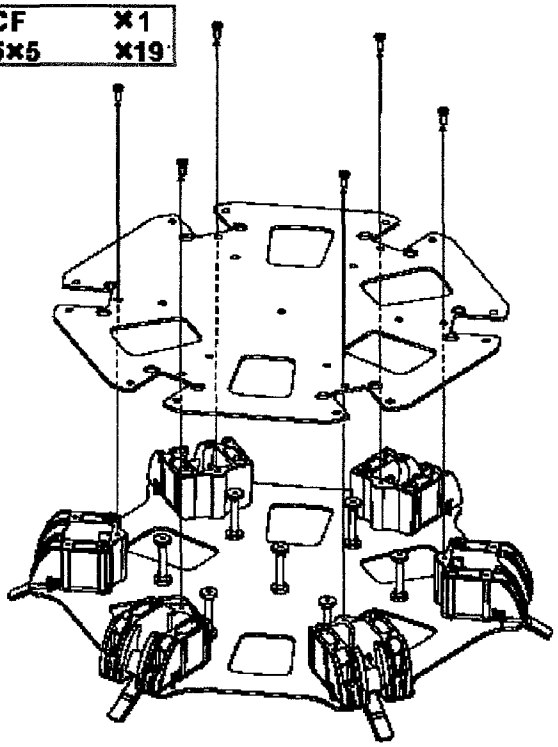
top board. XT60 Male

- Markings and stand for the propeller rotation direction. means clock-wise, and means counter clock-wise.If you need other lead connector, please cut the original connector and solder on the new connector. (But not Recommend)

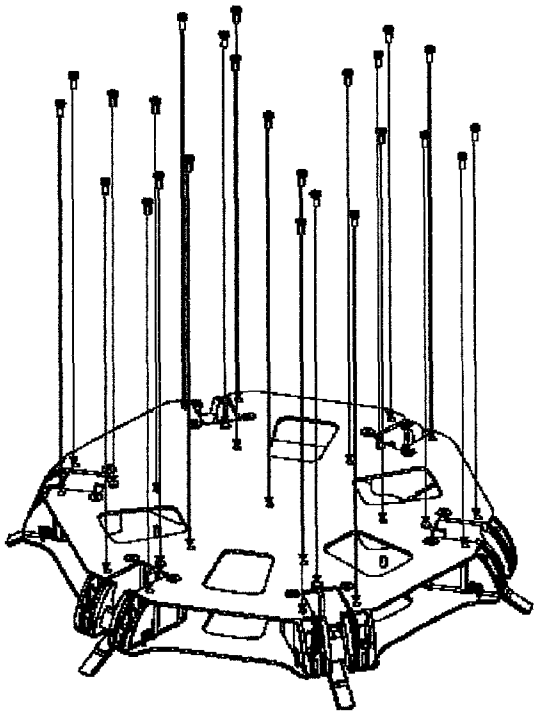
Mount Center Frame

Remove Screws

800CF	×1
M2.5×5	×19



Fix Screws



Step1: Mount IMU module into IMU position in the center frame. Ensure IMU casing is out of touch the top board edge, as vibration can cause IMU mal-function.

Step2: Please mount DJI Autopilot System parts onto the bottom board (not including GPS modules). Please remove all the screws from the bottom board first if necessary.

Step3: Connect Autopilot System and receiver. Please refer to DJI *WKM User Manual* for details. **Step4:** Please mount the screws to bottom board, and use adequate screw glue.

Step5: Mount the GPS on the top board with a bracket.

Step6: Configure Autopilot System. Please refer to DJI *WKM User Manual.*

Notices:

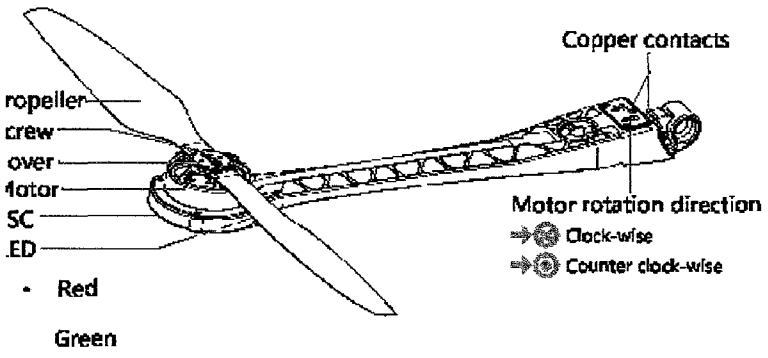
- Make sure to mount the IMU module at the IMU position first.
- Mount the GPS with a bracket, to avoid interference from center frame power board.
- Ensure the USB port of the M.C. outwards for easy access.
- Please wire neatly. Make sure wires will not be cut by the edge of frames.

Tips:

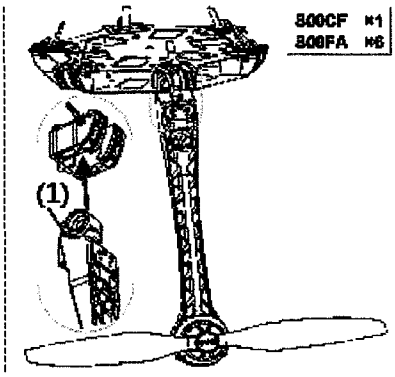
- Install screws with appropriate strength to prevent damage threads.

Mount Frame Arms

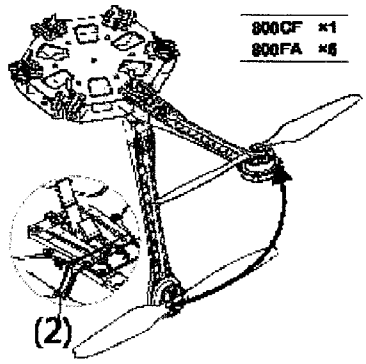
Step 1



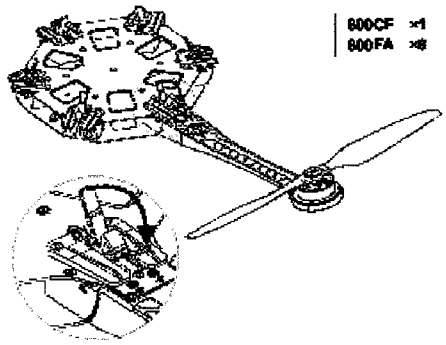
Step 2



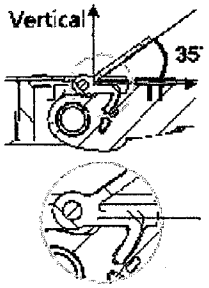
Step 3



Step 4



Step 5



Step1: Check arms.

(1) Make sure copper contacts are in good condition without bend or severe wear. n
(2) Make sure propellers are without crack, and screws in propeller cover tight.
(3) Make sure motors are mounted firmly, and rotate freely.
(4) Distinguish LED indicator on the ESC bottom. With a red point in is red LED, others are green LED. We recommend you mount arms with red LED to M1 and M2.
(5) Distinguish marks and on the arms.

Arm Center frame

Arm Center frame

Step2: Insert frame arm into center frame vertically. ×1 800FA

Step3: Slowly rotate the frame arm upward until positioned completely.

Step4: Press down the buckle to lock the arm. Make sure the arm does not move.

Step5: Make sure the buckle is pressed down correctly, about 35° under normal circumstances.

Notices: • Please add some lubricant at the position (1) if it is hard to press down the buckle.

- Slowly rotate the frame arm to prevent from breaking the copper contacts.

- Please refer to (2) to ensure the arm is perfectly positioned.
- Make sure use appropriate strength to press down the buckle correctly.
- Do not hot plug arms.
- If the motor mount loosens, please tighten it by following the procedures in *trouble shooting* of *Appendix.*

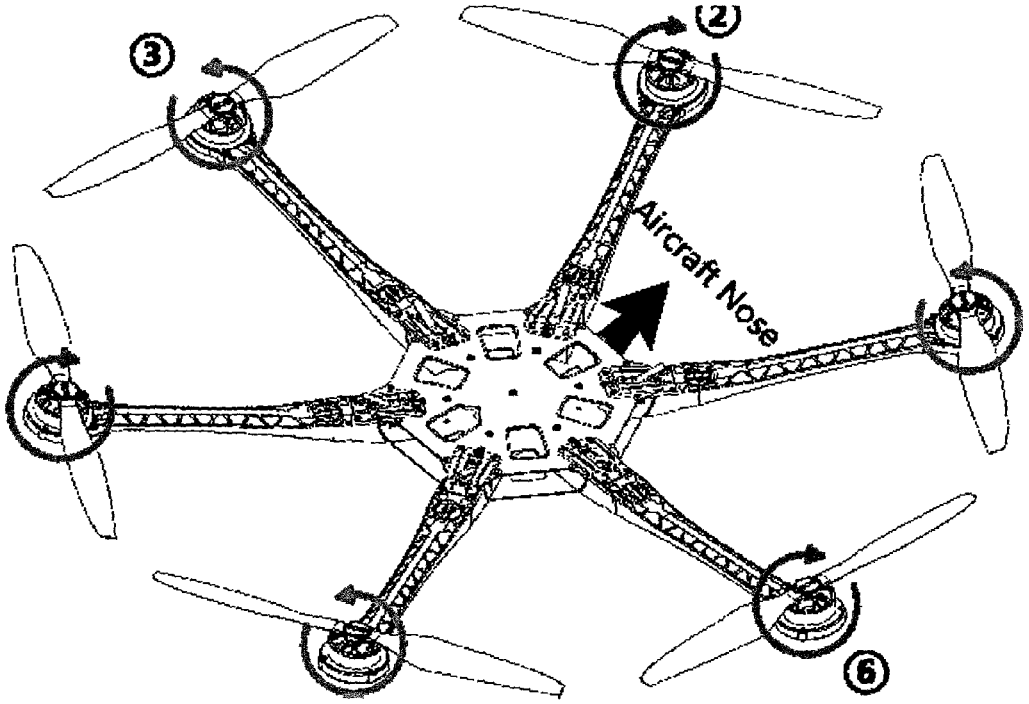
Tips:

-

LED is on after motor start.

Examination

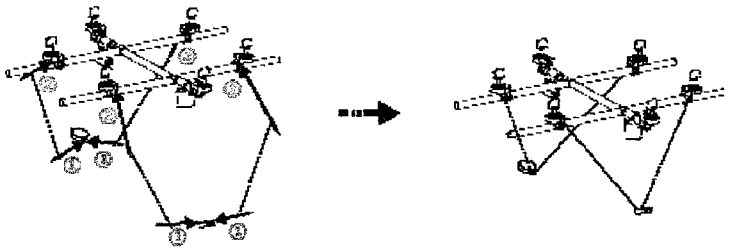
Arms(D®are aircraft nose direction, arms®® are aircraft tail. See from top, motors on arms(D®® rotate counter clockwise; motors on arms®®® rotate clockwise.



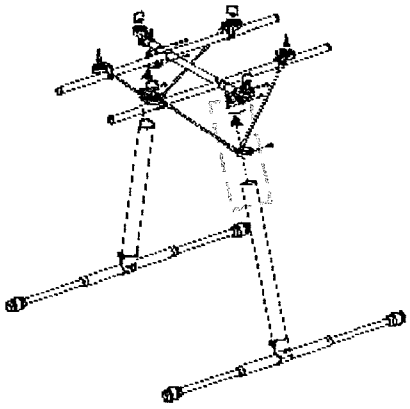
Mount Bi-pod

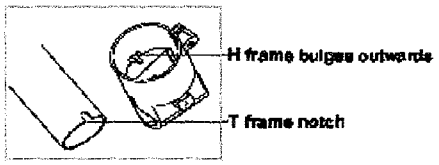
Step1

800HF	X1
800BD	X4
800AR	X2
HC-M2.5X5	X8



M2.5X8	x4
HC-M3.0X22	x2

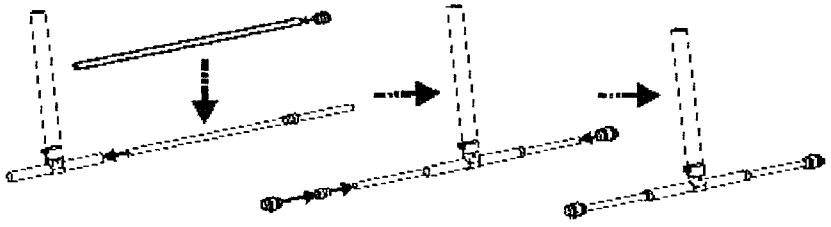




Step3

Step2 (Fix, but not tighten screws)

800TF	x2
800BP	x2
800SRD	x4
800ND	x4



Step1: Mount T frame 800TF and base pipe 800BP.

(1) Put nonslip damper 800ND through the base pipe.
(1) Put the base pipe into T frame until the head of nonslip damper is embedded into T frame.
(2) Embed the other nonslip damper into the T frame.
(2) Put silicon rubber damper 800SRD onto both sides of the base pipe.

Step2: Mount H frame800HF and bi-pod drawbars 800BD.

(1) Fix (but not tighten) hexagonal socket head cap screws M2.5×5 (Fig.①) to H frame and bi-pod drawbar (Fig.①).

(2) Adjust drawbar and T frame, and fix (but not tighten) hexagonal socket head cap screw M2.5×5 (Fig.②) to drawbar and aluminum ring 800AR.

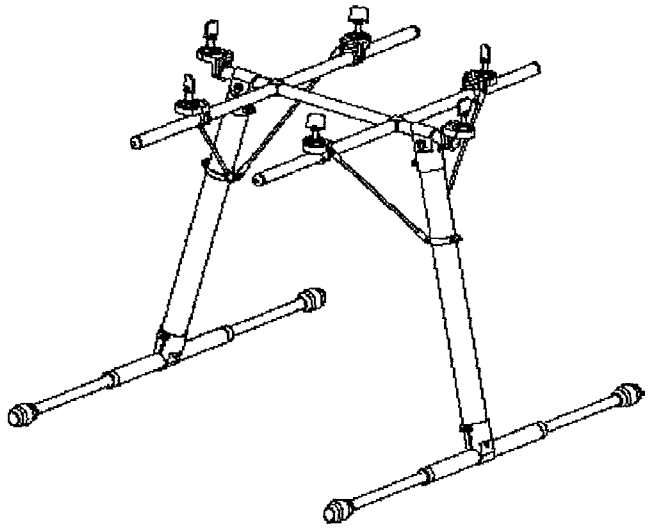
Step3: Mount H frame and T frame.

(1) Insert T frame through aluminum ring until it plugs into H frame.
(2) Fix T frame notch into H frame bulges outwards, make sure T frame will not move.
(3) Put the bi-pod on the flat floor to adjust H frame and T frame.
(4) Tighten all hexagonal socket head cap screws (including ① and ②).

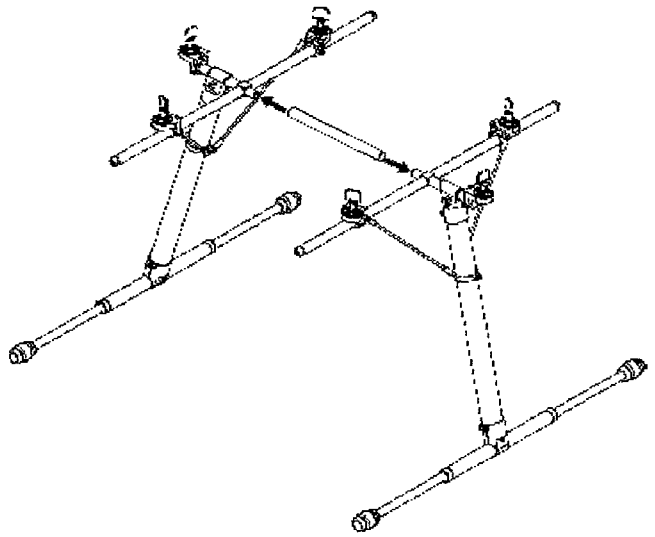
Notices:

- Put bi-pod on the flat floor to finish mounting smoothly and correctly.
- Please mount the screws and use adequate screw glue.
- Separate the bi-pod by disconnecting the H frame to make for easy carriage.

Completed

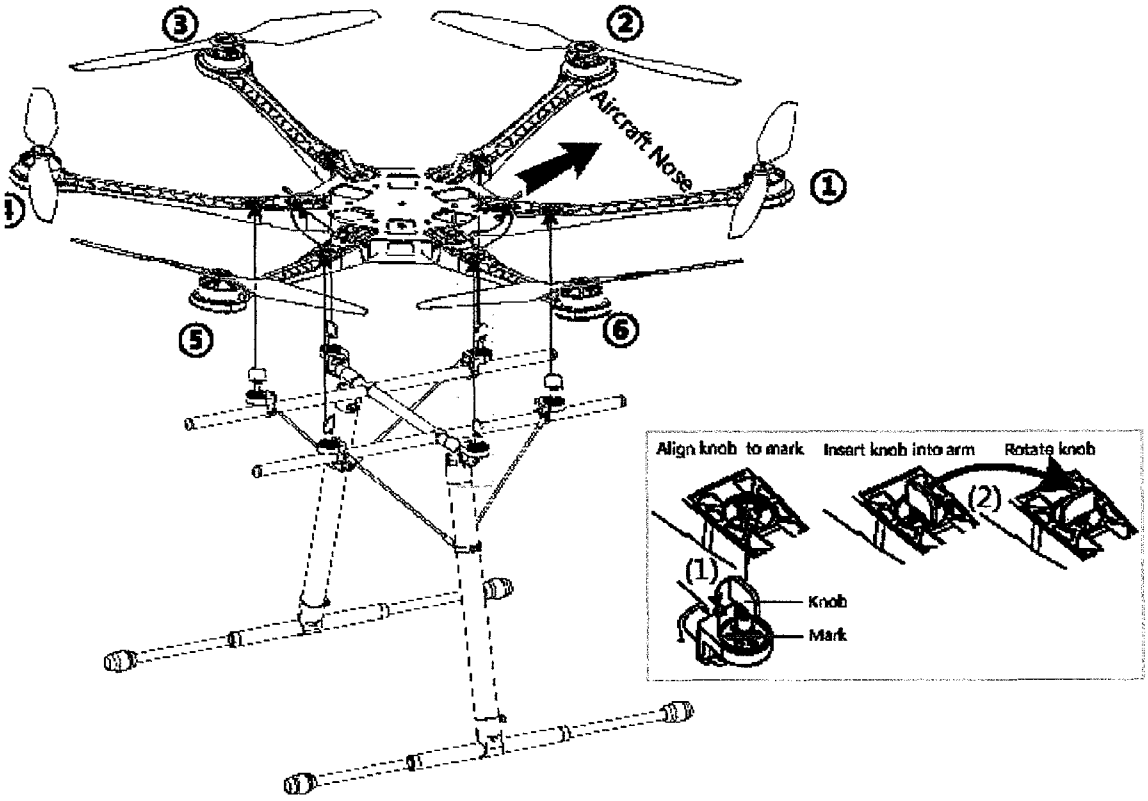


Quick Disassembly



Assembly

Assembly



Step1: Align all knobs on the H frame to the marks; refer to fig **(1)**.
Step2: Lie frame and bi-pod horizontally, insert knobs into arms ③ and ⑥ first, and then adjust to insert others into the arms.

Step3: Rotate the knob to the end, as fig **(2)** shown.

Notices:

⑥

⑤

- Ensure all knobs on the H frame aligned to the marks, and they would go through the arms successfully.

Tips:

()

- It is convenient for you to carry S800 by quick disassembly (Frame, Bi-pod, Frame and Bi-pod).

ESC Sound

ESC State	Sound
Ready	♪1234567
Throttle stick is not at bottom	BBBBBB...
Input signal abnormal	B B B...
Input voltage abnormal	BB—BB—BB—BB...

Tips:
DJI ESCs are specially designed for multi-rotors. When use with DJI autopilot systems, you do not have to setup any parameters or calibrate travel range.

Specifications

Frame

Diagonal Wheelbase	800mm
Frame Arm Length	350mm
Frame Arm Weight	304g
(Including Motor, ESC, Propeller)	
Center Frame Diameter	240mm
Center Frame Weight	365g
Bi-pod Size	500mm(Length)×415mm(Width)×320mm(Height) (Top width: 145mm)
Bi-pod Weight	428g
Total Weight	2.6Kg

Motor

Stator Size	41×14mm
KV	320rpm/V
Max Power	360W
Weight	147g

ESC

Current	40A OPTO**Voltage**	6S LiPo
Signal Frequency	30Hz ~ 450Hz	
Drive PWM Frequency	24KHz	
Weight	18g	

Propeller

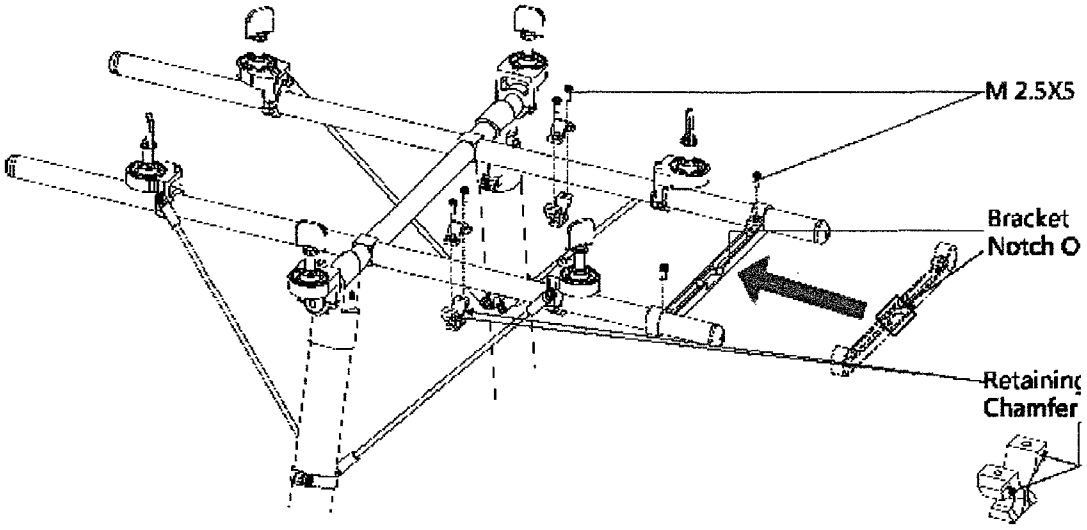
Material	Carbon Fiber
Size	15×04in
Weight	15g

Flight Parameters

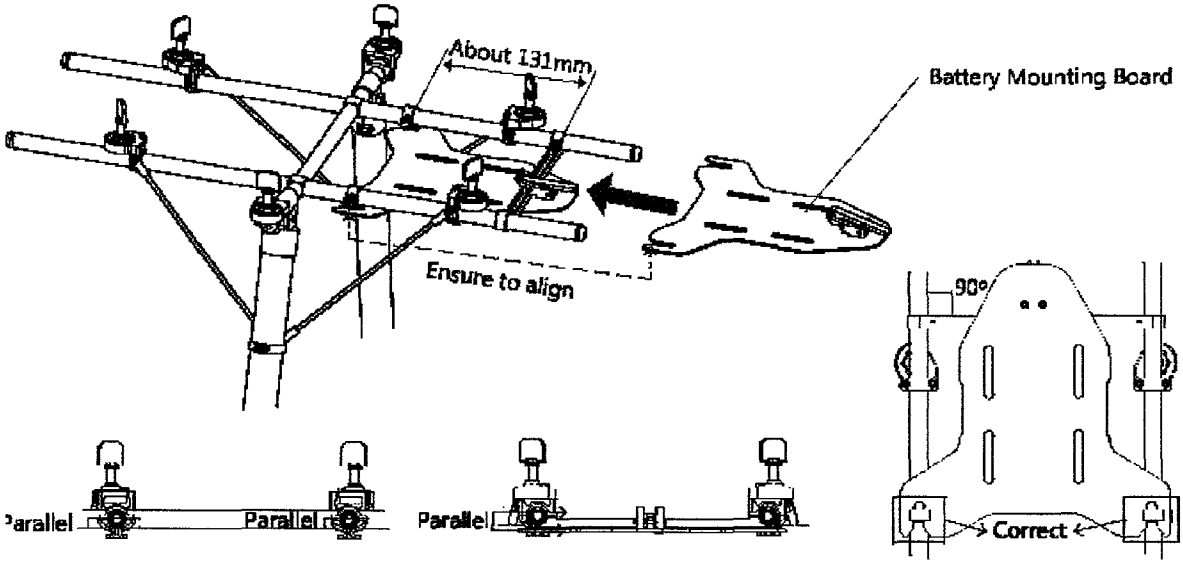
Takeoff Weight	5.0Kg ~ 7.0Kg
Load Weight	0Kg ~ 2.5Kg
Power Battery	LiPo (6S、10000mAh~15000mAh、15C(Min))
Max Power Consumption	2100W
Hover Power Consumption	720W(@ Takeoff Weight 6Kg)
Hover Time	Max: 16 min (@10000mAh&6KgTakeoff Weight)

AppendixMount Battery Bracket

Step1: Mount the retaining clip and the bracket, fix screws (but not tighten).



Step2: Place the mounting board and adjust its position, and then tighten all screws.

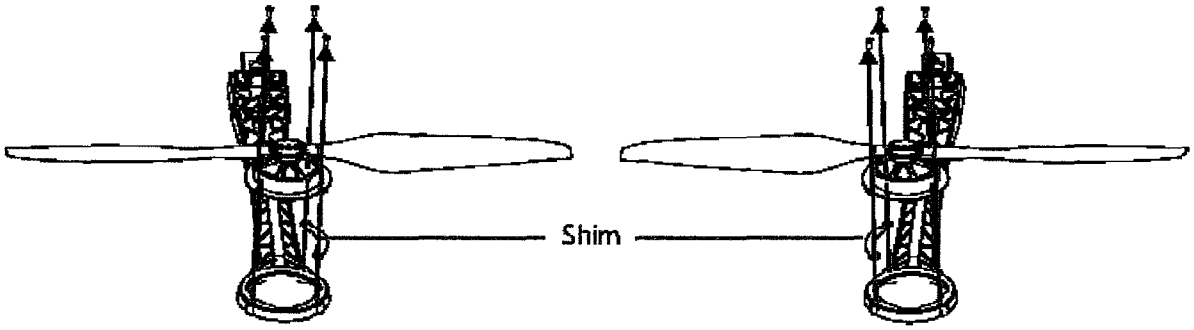


Step1 **For arms** **For arms**

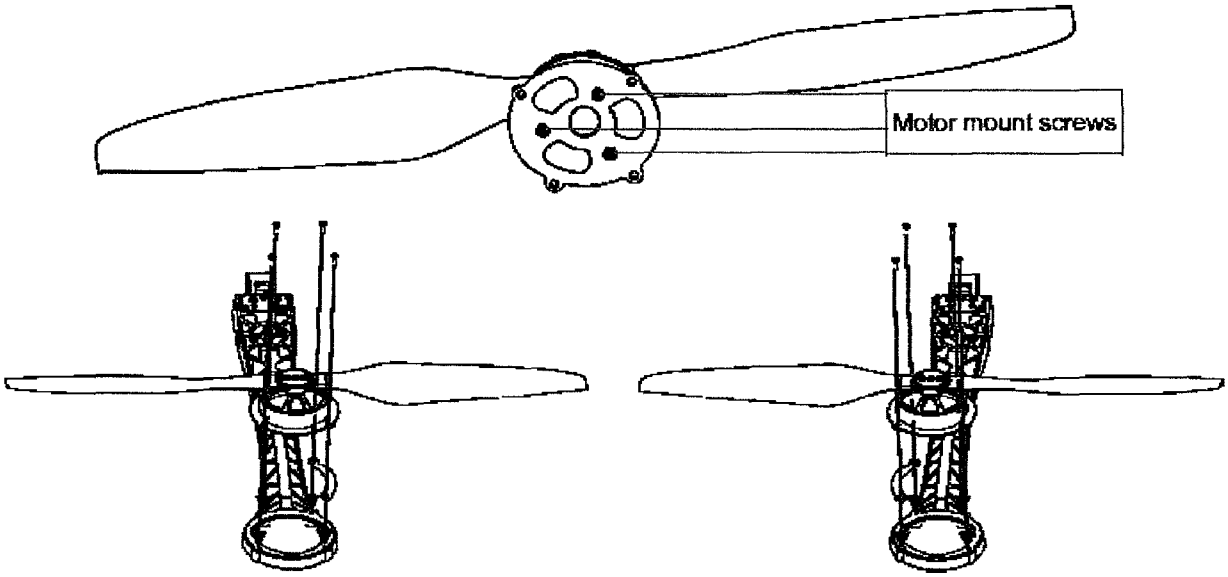
Step3 **For arms** **For arms**

Trouble Shooting

If the motor mount loosens, please tighten it by following the procedures.



Step2



Step1: Remove. Please unscrew the screws on the top.
Step2: Tighten. Retighten the motor mount screws on the back to make the motor firmly attached. **Step3: Remount.** Remount the screws on the top.

Notices:

Shim should be mounted in the correct position, as shim mount position of arm is different from arm .

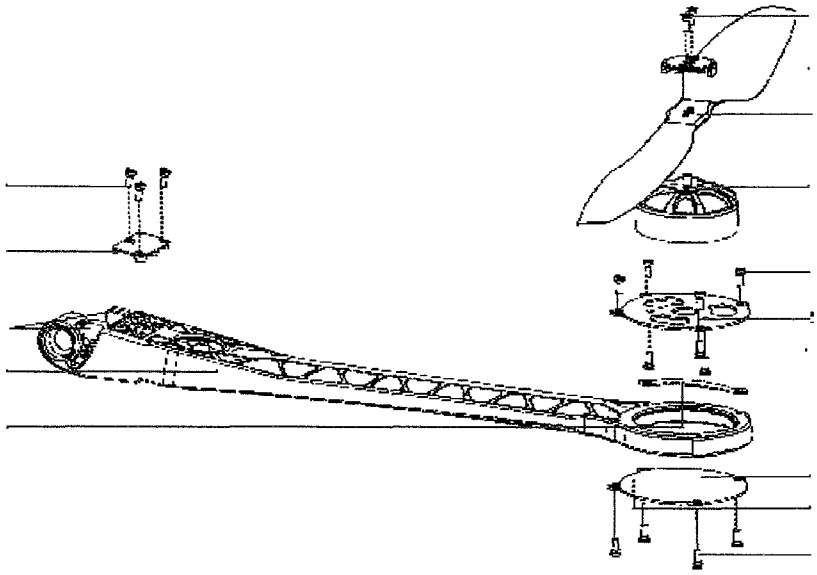
Tips:

Please use adequate screw glue.

- Install screws with appropriate strength.

Spare Parts Listing

If S800 needs part replaced, please refer to the following diagram to identify the part with the NO. and components, and then make a purchase. Each package includes screws needed.



NO.		Name		Components
1		15'Propeller CCW		S8010101A
2		15'Propeller CW		S8010101B

Components

3 4114 Motor 320KV S8010301, S8010302, S8010303

S8010401A, S8010402, S8010403, S8010404

5 Frame Arm (Clockwise) S8010401B, S8010402, S8010403, S8010404

6		ESC (Red LED)		S8010601, S8010602R

Frame Arm (Counter Clockwise)

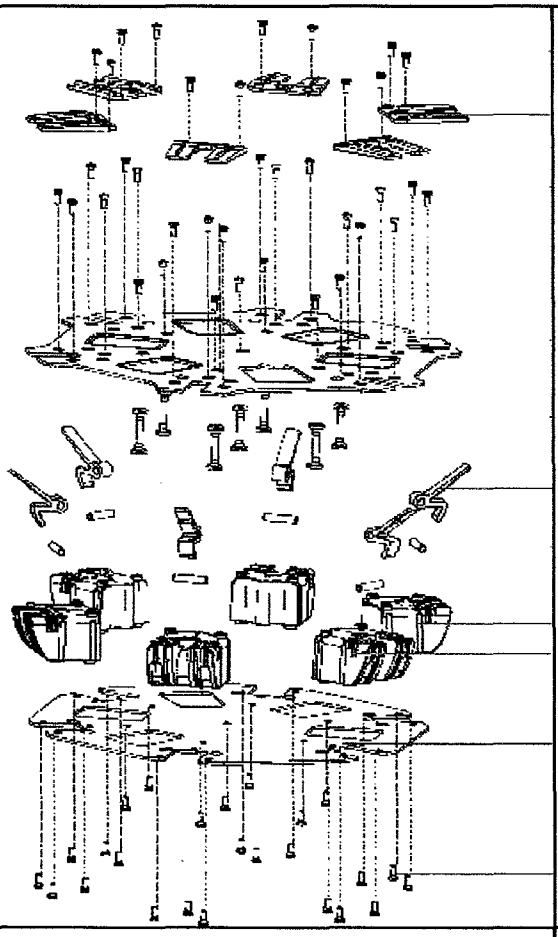
4

7 ESC (Green LED) S8010601, S8010602G

8		Frame Arm w/ Propeller& Motor& ESC 1. CCW & Red LED 2. CCW &Green LED 3. CW & Red LED 4. CW & Green LED	5.	1, 3, 4, 6 1,3,4,7 2,3,5,6 2,3,5,7

Notices:

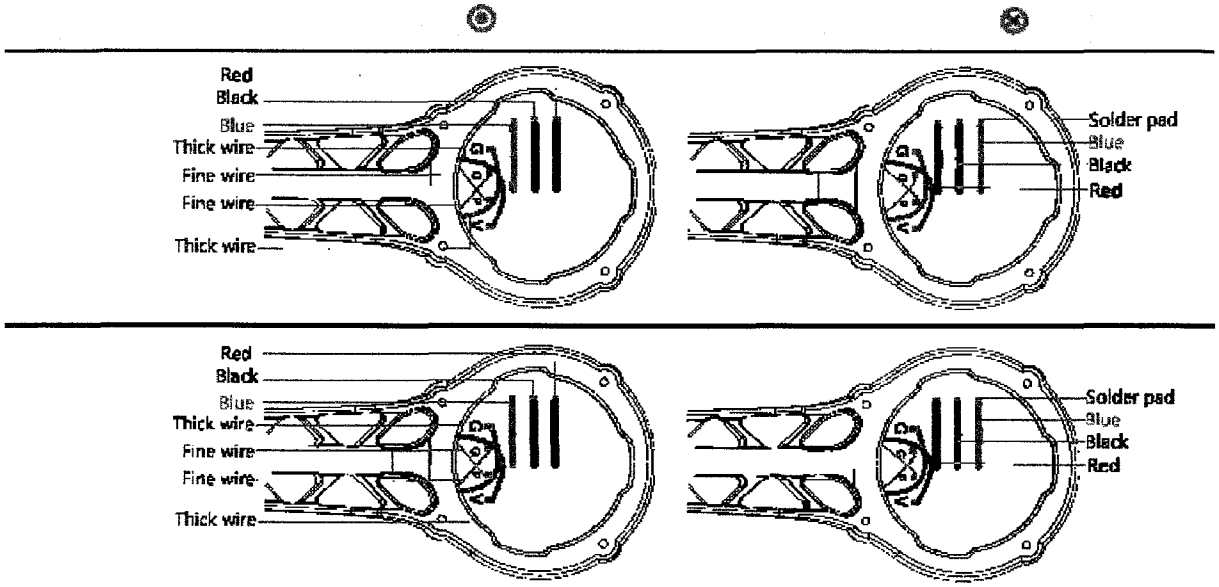
- The diagram is only for counter clockwise rotation propeller and frame arm.For clockwise propeller and frame arm, it is **S8010101B and S8010401B.**



8021

Sol20r 01

Ensure to solder thick wires and fine wires correctly, when solder ESC to frame arm.Clockwise and counter clockwise motor should be soldered to ESC correctly by different color order.



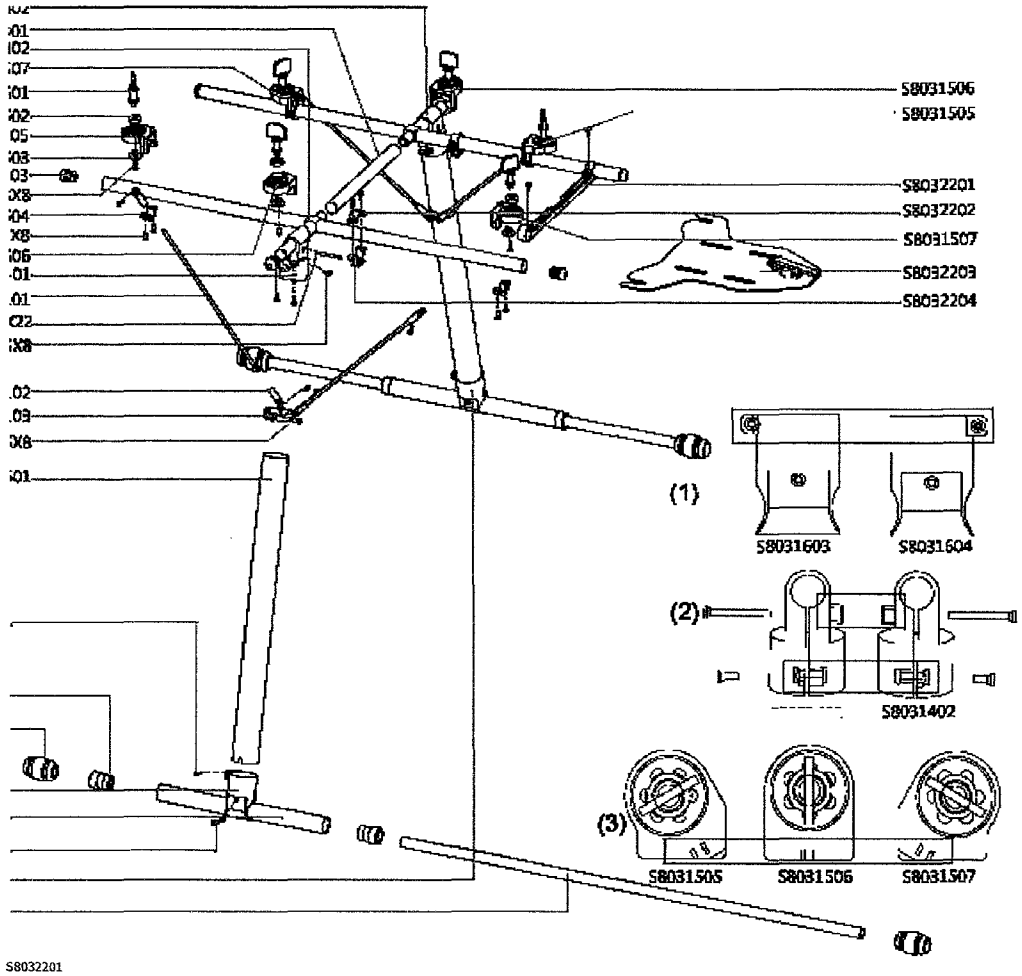
For arms

For arms

Enamel Wire

Shield Wire

NO.	Name	Components	
9	Arm Mounting Bracket	S8020901.S8020902.S8020903.	S8020904
10	Center Frame Support Pillar	S8021001	
11	Center Frame Top &Bottom Board	S8021101.S8021102	
12	Top Board Cover for Arm Mounting Bracket	S8021201	



S8032201

Note1: All unlabeled screws are HC-M2.5X5.()

Note2: (1) Left and right T-frames are different; (2) Left and right bi-pod top mounting hubs are different; (3) Left set, middle set and right set of bi-pod carbon tube bracket are different.

NO.		Name		() Components
13	H-Frame			S8031301.S8031302
14		Bi-pod Top Mounting Hub		S8031401.S8031402
15	H-Frame w/Bi-pod Top Mounting Hub			S8031501.S8031502.S8031503.S8031504. S8031505.S8031506.S8031507.13.14

16

T-Frame(Right)

S8031601, S8031602, S8031603

17 T-Frame(Left) S8031601, S8031602, S8031604

18		T-Frame Nonslip Damper (4pcs)		S8031801

19 T-Frame Silicone Rubber Damper (4pcs) S8031901

20		Bi-pod Carbon Tube		S8032001

21 Bi-pod Drawbar S8032101, S8032102(2pcs) , S8032103

22		Battery Tray		S8032201, S8032202, S8032203, S8032204

23 Bi-pod Carbon Tube Bracket(Left Set) S8031501, S8031502, S8031503, S8031504, S8031505

24 Bi-pod Carbon Tube Bracket(Middle Set)			S8031501, S8031502, S8031503, S8031504,
			S8031506

S8031501, S8031502, S8031503, S8031504,25 Bi-pod Carbon Tube Bracket(Right Set) S8031507

26		Screw Pack M2.5X5		10pcs

27 Screw Pack M3X8 10pcs

28		Screw Pack M2.5X8		10pcs

Lappert Smith's Unmanned Aircraft System Operations Manual

Part A

I. Responsibility and duties of support personnel in the operation of the UAS

a. ***Mission Commander***

i. The Mission Commander's main duty during the deployment of the UAS is to operate the UAS safely while accomplishing the goals of the client.

ii. The Mission Commander has absolute authority to reject a flight based on personnel safety or violation of FAA regulations

1. No member of the team, regardless of title, shall order an operator to make a flight when, in the opinion of the Mission Commander, it poses a risk to personnel or is in violation of FAA regulations

iii. Mission Commanders shall see-and-avoid any obstacle that will lessen safety during the mission

iv. Mission Commander shall be responsive to the requests of the observer in order to accomplish the deployment

b. ***Pilot in Command***

i. The Pilot In Command (PIC) is responsible for compliance with this manual, as well as applicable FAA regulations

ii. The PIC is directly responsible for, and is the final authority over the actual operation of the UAS

iii. The PIC shall monitor the radio with tower as needed for updates

c. ***Visual Observers***

i. Observers shall see-and-avoid any obstacle that will lessen safety during the mission and inform the PIC

ii. Observers shall operate any attachments to the UAS, allowing the PIC to maintain complete focus on the operation of the UAS.

iii. Observers shall remain alert for suspicious persons or activities on the ground and coordinate response by ground units.

iv. Observers shall assist the PIC to achieve the main objective of safe operation of the UAS

v. Observers shall be responsible for documentation for mission training and updating of flight books

II. Crew health and appropriately fitness prior to conducting any operations.

a. ***Medical Factors***

i. Operator and Observers shall only deploy the UAS when rested and emotionally prepared for the tasks at hand

ii. Physical illness, exhaustion, emotional problems, etc., can seriously impair judgment, memory and alertness

1. Any operator, pilot, or observer is expected to refrain from conducting UAS operations when a problems exists that could reasonably be expected to affect their ability to perform flight duties

iii. A self-assessment of physical condition shall be made by all members during pre-flight activities

iv. No member shall act as an operator or observer within eight hours after consumption of any alcoholic beverage or while under the influence of alcohol

Part B

I. Operating Documents

a. This Operations Manual, the UAS manufacturers manual, and a grant of exemption and/or Certificate of Authorization (COA), will ***at all times*** during the UAS's operation be accessible and available for presentation upon request from a law enforcement official or other proper authority

II. Preflight

a. **Prior to** each flight, the PIC inspect the UAS to ensure it is safe for operation

i. **No** operations shall be conducted until a condition that affects safe operation, if one exists, is corrected

1. **Any** replacement or maintenance of a flight critical component must undergo a functional test flight
    a. **Each** maintenance event *must* be documented and signed prior to resuming UAS to operations.

b. Airframe Inspection
    i. Cracks (especially in high stress areas like joints)
    ii. Loose or damaged screws / fasteners / bands / straps / ties
    iii. Loose or damaged wiring
    iv. Loose or damaged connections (solder, plugs, etc)
    v. Inspect prop mounts, screws and apply slight counter pressure on arms to check for loosened construction
    vi. Battery/batteries fully charged (25.2 volts), properly seated and secured
    vii. Remove props and test fail-safe behavior
    viii. Props are smooth and free of damage/defect (blade, surface, & hub)
    ix. Tighten prop adapters
    x. Ensure voltage alarm is connected
    xi. Ensure arming/idle timeout is properly configured
    xii. Check your RC transmitter shows the right range and centering for all sticks
    xiii. If desired, perform range test Check RC(TX/RX) operation range (on the ground!) from time to time (and before 1st flight)

c. **POWER UP PROCEDURE**
    i. Batteries charged & secured
    ii. Plan aircraft mission coordinates in accordance with location and possible hazards
    iii. Position aircraft in a level, safe location for takeoff
    iv. If using onboard video recorder (i.e., Gopro), turn on camera
    v. All transmitter controls must move freely in all directions
    vi. All transmitter trims must be in their neutral positions
    vii. All transmitter switches must be in the correct position (Transmitter throttle to zero)

viii. Turn on radio transmitter on

ix. Connect/power on battery to airframe

x. Ensure led indicators & audible tones are all indicating correctly

xi. Ensure the autopilot has a GPS fix. When switching to Loiter mode, listen for a beep or TX to say flight mode 2

xii. For manual start ensure Loiter and Auto controls are turned off, and set to Stabilize

xiii. Ensure compasses are calibrated and the right setting is loaded.

xiv. Timer on (if applicable)

xv. Stand clear - audibly, loudly announce the word **"CLEAR!"**

xvi. Arm flight controller

III. Take-off

a. Operating limitations and conditions

i. Minimum Personnel Requirements

1. The minimum personnel required on **ALL** missions will be a ***Mission Commander, PIC*** and ***at least one (1) Observer***.

a. Under ***no*** circumstances will a PIC attempt to complete a deployment alone

b. Certificate of Authorization (COA)

i. No UAS operations will begin until a COA is obtained for that PIC *unless*

1. Otherwise allowed by law or specific FAA exemption

ii. A Notice to Airman (NOTAM) will be requested no more than 72 hours in advance, but no less than 12 hours prior to, any planned operation *unless*

1. Otherwise allowed by law or specific FAA exemption

c. Markings:

i. N-Number markings must be as large as practicable and in accordance with FAA guidelines

d. In flight

i. **NO operations of any kind will be conducted in within a five (5) nautical miles vicinity of an airport reference point without written consent from the controlling agency, office, or authority**

ii. All UAS operation will be conducted a safe distance from people, animals and objects

e. Take-off Weight
    i. The UAS take-off weight must not exceed 30 pounds.

f. Maximum Speed
    i. The UAS will operate at a speed no greater than 30 miles per hour.

g. Maximum Operational Height in AGL
    i. The UAS will be operated at an altitude of no more than 400 ft above ground level (AGL)

h. Minimum Operating Battery Power Level
    i. All UAS operations will cease when the battery power level reaches 30% of full capacity

i. Pilot in Control (PIC)
    i. **ANY AND ALL** operations will be conducted by a PIC with a private pilot license and who holds at least a **Second-Class** Medical.
    ii. The PIC must be designated prior to take-off
        1. The designation of PIC cannot be transferred ***at any time*** during operations

j. Visual Observer (VO)
    i. No UAS operations will be conducted without at least **one** (1) visual observer

k. Visual Line of Sight (VLOS) operation
    i. At all times, the UAS will be operated within visual line of sight of the VO

l. Visual Meteorological Conditions (VMC)
    i. UAS operations will be conducted during the ***daytime only*** and under visual meteorological conditions

IV. Landing

a. Turn off the Multi-Rotor first and disconnect the flight battery before turning off the transmitter

V. Emergency Procedures

a. Pre-determined landing area

i. In the event of flight termination due to a critical system failure, the UAS must be programmed to land in a pre-determined location.

VI. **After the flight (post-flight Check)**

a. Disconnect the battery

b. Visually inspect the body and propellers.

c. Document any damaged or structurally deficient areas.

Part C

I. Maintenance

a. UAS maintenance activities will be conducted in accordance with the procedures specified in the Maintenance Manual

b. Specialist equipment items maintenance activities will be conducted in accordance with the respective manufacturers' service manuals by persons with technical knowledge and expertise

II. Maintenance

a. **Each** maintenance event *must* be documented and signed prior to resuming any UAS to operations

b. Records

i. Maintenance Records shall be kept on file and available for inspection or review within a reasonable period of time