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DEPARTMENT OF
TRANSPORTATION
FAA OPERATIONS

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June 25, 2014

Sent via certified mail # 7007 3020 0001 9310 1413 [return receipt requested]

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

Re: Exemption Request Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from 14 C.F.R. 45.23(b); 14 CFR Part 21; 14 CFR 61.113 (a) & (b); 91.7 (a); 91.9 (b) (2); 91.103(b); 91.109; 91.119; 91.121; 91.151(a); 91.203(a) & (b); 91.405 (a); 91.407(a) (1); 91.409 (a) (2); 91.417 (a) & (b).

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 C.F.R. Part 11, CAVU Media LLC, developer and operator of Small Unmanned Aircraft Systems ("sUASs") equipped to conduct aerial photography for the motion picture and television industry for scripted closed set filming, hereby applies for an exemption from the listed Federal Aviation Regulations ("FARs") to allow commercial operation of its sUASs, 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 333.¹

As described more fully below, the requested exemption would permit the operation of small, unmanned and relatively inexpensive sUAS under controlled conditions in airspace that is: 1) limited; 2) predetermined; 3) controlled as to access; and, 4) would provide safety enhancements to the already safe operations in the film and television industry presently using conventional aircraft. Approval of this exemption would thereby enhance safety and fulfill the Secretary of Transportation's (the FAA Administrator's) responsibilities to "...establish requirements for the safe operation of such aircraft systems in the national airspace system." Section 333(c) of the Reform Act.

¹ The conditions proposed by the applicant are drawn from Order 8900.1 CHG 0, Volume 3, Chapter 8-Issue a Certificate of Waiver for Motion Picture and Television Filming.

The name and address of the applicant is:

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Regulations from which the exemption is requested:

14 CFR Part 21
14 C.F.R. 45.23(b)
14 CFR 61.113 (a) & (b)
14 C.F.R. 91.7 (a)
14 CFR 91.9 (b) (2)
14 C.F.R. 91.103
14 C.F.R. 91.109
14 C.F. R. 91.119
14 C.F.R. 91.121
14 CFR 91.151 (a)
14 CFR 91.203 (a) & (b)
14 CFR 91.405 (a)
14 CFR 407 (a) (1)
14 CFR 409 (a) (2)
14 CFR 417 (a) & (b)

This exemption application is expressly submitted to fulfill Congress' goal in passing Section 333(a) through (c) of the Reform Act. This law 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 UASs 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 of the operator.

Reform Act § 333 (a). Lastly, if the Secretary determines that such vehicles "may operate safely in the national airspace system, the Secretary shall establish

requirements for the safe operation of such aircraft in the national airspace system.”
Id. §333(c) (emphasis added)²

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 sUASs, 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. §44701(f) See also 49 USC §44711(a); 49 USC §44704; 14 CFR §91.203 (a) (1).

CAVU Media LLC’s sUASs are rotorcraft, weighting 55 or fewer lbs. including payload. They operate, under normal conditions at a speed of no more than 50 knots and have the capability to hover, and move in the vertical and horizontal plane simultaneously. They will operate only in line of sight and will operate only within the sterile area described in the Confidential Motion Picture and Television Operations Manual, attached as Exhibit 1 (hereinafter “the Manual”).³ Such operations will insure that the sUAS will “not create a hazard to users of the national airspace system or the public.”⁴

Given the small size of the sUASs involved and the restricted sterile environment within which they will operate, the applicant falls squarely within that zone of safety (an equivalent level of safety) in which Congress envisioned that the FAA must, by exemption, allow commercial operations of UASs to commence immediately. Also due to the size of the UASs and the restricted areas in which the relevant sUASs 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 the significant public benefit, including enhanced safety, reduction in environmental impacts, including reduced emissions associated with

² Applicant interprets this provision to place the duty on the Administrator to not only process applications for exemptions under section 333, but for the Administrator to craft conditions for the safe operation of the UAS, if it should be determined that the conditions set forth herein do not fulfill the statutory requirements for approval.

³ The Motion Picture Association of America has reviewed this manual and has found it to be acceptable for sUAS filming operations for the television and movie industry. Applicant submits this manual as a Confidential document under 14 CFR 11.35 (b) as the entire manual contains proprietary information that the applicant has not and will not share with others. The manual contains operating conditions and procedures that are not available to the public and are protected from release under the Freedom of Information Act 5 USC 552 et.seq.

⁴ Reform Act Section 333 (b).

allowing UASs for movie and television operations, the grant of the requested exemptions is in the public interest. Accordingly, the applicant respectfully requests that the FAA grant the requested exemption without delay.

AIRCRAFT AND EQUIVALENT LEVEL OF SAFETY

The applicant proposes that the exemption requested herein apply to civil aircraft that have the characteristics and that operate with the limitations listed herein. These limitations provide for at least an equivalent or even higher level of safety to operations under the current regulatory structure because the proposed operations represent a safety enhancement to the already safe movie and television filming operations conducted with conventional aircraft.

These limitations and conditions to which CAVU Media LLC agrees to be bound when conducting commercial operations under an FAA issued exemption include:

1. The sUAS will weigh less than 55 lbs.
2. Flights will be operated within line of sight of a pilot and/or observer.
3. Maximum total flight time for each operational flight will be 30 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 30 minute limit.
4. Flights will be operated at an altitude of no more than 400 feet AGL or, not more than 200 feet above an elevated platform from which filming is planned.
5. Minimum crew for each operation will consist of the sUAS Pilot, the Visual Observer, and the Camera Operator.
6. sUAS pilot will be an FAA licensed airman with at least a private pilot's certificate and third class medical. The observer will hold at least a third class medical.
7. sUAS Pilot will be Pilot in Command (PIC). If a pilot certificate holder other than the sUAS Pilot, who possess the necessary PIC qualifications, is also present on set (i.e. the Aerial Coordinator), that person can also be designated as PIC.
8. The UAS will only operate within a confined "Sterile Area" as defined in the Manual. Section H, I and J of the Manual requires the establishment of a "Security Perimeter" for the flight operations area.
9. A briefing will be conducted in regard to the planned sUAS operations prior to each day's production activities. It will be mandatory that all personnel who will be performing duties within the boundaries of the safety perimeter be present for this briefing.
10. The operator will file a FAA Form 7711-1, or its equivalent, as modified in light of the requested exemption, with the appropriate Flight Standards District Office.
11. 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, as required by Section K of the Manual. With the advanced permission of the relevant FSDO, operations at closer range can be approved.

12. The operator will submit a written Plan of Activities to the FSDO three days before the proposed shoot as required in Section K of the Manual.
13. Pilot and 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 Sections M and N of the Manual.
14. Observer and pilot will at all times be able to communicate by voice and/or text.
15. Written and/or oral permission from the relevant property holders will be obtained.
16. 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.
17. If the sUAS loses communications or loses its GPS signal, the UAS will have capability to return to a pre-determined location within the Security Perimeter and land.
18. The sUAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates 14 C.F.R. §91.203 (a) (1)

Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR §91.203 (a) (1). Given the size and limited operating area associated with the aircraft to be utilized by the Applicant, 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 for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS. In all cases, an analysis of these criteria demonstrates that the UAS operated without an airworthiness certificate, in the restricted environment and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

The sUAS to be operated hereunder is less than 55 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured area as set out in the Manual. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the operator, pursuant to the Manual's 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 filming. The FAA will have advance notice of all operations. These safety enhancements, which already apply to civil aircraft operated in connection with motion picture and television 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 C.F.R. § 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 sUAV, 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 sUAV marked on its fuselage as required by §45.29 (f) where the pilot, observer and others working with the sUAV 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 and 10167A.

14 C.F.R. § 61.113 (a) & (b): Private Pilot Privileges and Limitations: Pilot in Command.

Sections 61.113 (a) & (b) limit private pilots to non-commercial 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 sUAS 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 Manual. The level of safety provided by the requirements included in the Manual exceeds that provided by a single individual holding a commercial pilot's certificate operating a conventional aircraft. The risks associated with the operation of the sUAS are so diminished from the level of risk associated with commercial operations contemplated by Part 61 when drafted, that allowing operations of the sUAS as requested with a private pilot as the PIC exceeds the present level of safety achieved by 14 C.F.R. §61.113 (a) & (b).

14 C.F.R. §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 Manual for maintenance and use of safety check lists prior to each flight, as set forth in Sections J, L and Q, an equivalent level of safety will be provided.

14 C.F.R. § 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 sUAS, 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 flight manual at the ground control point where the pilot flying the sUAS 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, and 10700.

14 C.F.R. § 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 Sections J and K of the 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.

14 C.F.R. §91.109: Flight instruction:

Section 91.103 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.

sUASs 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 neither a pilot nor passengers will be carried in the aircraft and by the size and speed of the aircraft.

14 C.F.R. §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 sUAS that is a helicopter and the exemption requests authority to operate at altitudes up to 400 AGL, or not more than 200 above an elevated platform from which filming is planned, an exemption may be needed to allow such operations. As set forth herein, except for the limited conditions stated in the Manual, the UAS will never operate at higher than 400 AGL. It will however be operated in a restricted area with security perimeter, 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, speed of the UAS as well as the location where it is operated. No flight will be taken without the permission of the property owner or local officials. Because of the advance notice to the property owner and participants in the filming activity, all affected individuals will be aware of the planned flight operations as set forth in Section K of the Manual. Compared to flight operations with aircraft or rotorcraft weighting far more than the maximum 55lbs. 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 AGL in the movie industry. In addition, the low-altitude operations of the sUAS will ensure separation between these small-UAS operations and the operations of conventional aircraft that must comply with Section 91.119.

14 C.F.R. §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 sUAS may 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 Manual and Safety Check list, confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

14 C.F.R. § 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 sUAS provides approximately 40 minutes of powered flight. To meet the 30 minute reserve requirement in 14 CFR §91.151, sUAS flights would be limited to approximately 10 minutes in length. 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.

Applicant believes that an exemption from 14 CFR §91.151(a) falls within the scope of prior exemptions. See Exemption 10673 (allowing Lockheed Martin Corporation to operate without compliance with FAR 91.151 (a)). Operating the small UAS, in a tightly controlled area where only people and property owners or official representatives who have signed waivers will be allowed, with less than 30 minutes of reserve fuel, does not engender the type of risks that Section 91.151(a) was intended to alleviate given the size and speed of the small UAS. Additionally, limiting sUAS flights to 10 minutes would greatly reduce the utility for which the exemption will be granted.

Applicant believes that an equivalent level of safety can be achieved by limiting flights to 30 minutes or 25% of battery power whichever happens first. This restriction would be more than adequate to return the sUAS 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, and 10808.

14 C.F.R. §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 (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.

The UAS fully loaded weighs no more than 55 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 sUAS.

An equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the sUAS will have immediate access to them, to the extent they are applicable to the sUAS. 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 C.F.R. §91.405 (a); 407 (a) (1); 409 (a) (2); 417(a) & (b): 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 applicant. Maintenance will be accomplished by the operator pursuant to the flight manual and operating handbook as referenced in the Manual.(See Sections L and Q) An equivalent level of safety will be achieved because these small UASs 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 feet AGL. As provided in the Manual, the operator will ensure that the UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance performed. 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:

Applicant seeks an exemption from the following rules:

14 C.F.R. §21, subpart H; 14 C.F.R 45.23(b);14 C.F.R. §§ 61.113(a) & (b);91.7 (a); 91.9 (b) (2);91.103(b);91.109; 91.119; 91.121; 91.151(a);91.203(a) and (b); 91.405 (a); 91.407 (a) (1); 91.409 (a) (2); 91.409 (a) (2) and 91.417 (a) & (b) to operate commercially a small unmanned vehicle (55lbs or less) in motion picture and television operations.

Approval of exemptions allowing commercial operations of sUASs in the film industry will enhance safety by reducing risk. Conventional film operations, using jet or piston power aircraft, operate at extremely low altitudes just feet from the subject being filmed and in extreme proximity to people and structures; and present the risks associated with vehicles that weigh in the neighborhood of 4,000lbs., carrying large

amounts of jet A or other fuel (140 gallons for jet helicopters shown below). Such aircraft must fly to and from the film location. In contrast, a sUAS weighing fewer than 55 lbs. and powered by batteries eliminates virtually all of that risk given the reduced mass and lack of combustible fuel carried on board. The sUAS is carried to the film set and not flown. The sUAS will carry no passengers or crew and, therefore, will not expose them to the risks associated with manned aircraft flights.

The operation of small UASs, weighting less than 55 lbs., conducted in the strict conditions outlined above, will provide an equivalent level of safety supporting the grant of the exemptions requested herein, including exempting the applicant from the requirements of Part 21 and allowing commercial operations. These lightweight aircraft operate at slow speeds, close to the ground, and in a sterile environment and, as a result, are far safer than conventional operations conducted with turbine helicopters operating in close proximity to the ground and people.

Privacy

All flights will occur over private or controlled access property with the property owner's prior consent and knowledge. Filming will be of people who have also consented to being filmed or otherwise have agreed to be in the area where filming will take place. The grant of this exemption request will provide improved safety in both day and night operations.

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 applicant's UAS in the motion picture and television industry pursuant to the Manual appended hereto.

Sincerely yours,

The Law Offices of

DONALD J. MELANCON, LLC.

By: 

Donald J. Melancon

Attorney at Law

Enclosures

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Name	Type	City	Status
CAVU MEDIA LLC	Limited Liability Company	NEW ORLEANS	Active

Business: CAVU MEDIA LLC

Charter Number: 41509685K

Registration Date: 5/5/2014

State Of Origin:

Domicile Address

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Mailing Address

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NEW ORLEANS, LA 70113

Status

Status: Active

Annual Report Status: In Good Standing

File Date: 5/5/2014

Last Report Filed: N/A

Type: Limited Liability Company

Registered Agent(s)

Agent:	IAN COTITA
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City, State, Zip:	NEW ORLEANS, LA 70113
Appointment Date:	5/5/2014

Agent:	WILLIAM WHEELER
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City, State, Zip:	NEW ORLEANS, LA 70130
Appointment	5/5/2014

Date:

Officer(s)

Additional Officers: No

Officer: IAN COTITA
Title: Manager
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City, State, Zip: NEW ORLEANS, LA 70113

Officer: WILLIAM WHEELER
Title: Manager
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City, State, Zip: NEW ORLEANS, LA 70130

Amendments on File

No Amendments on file

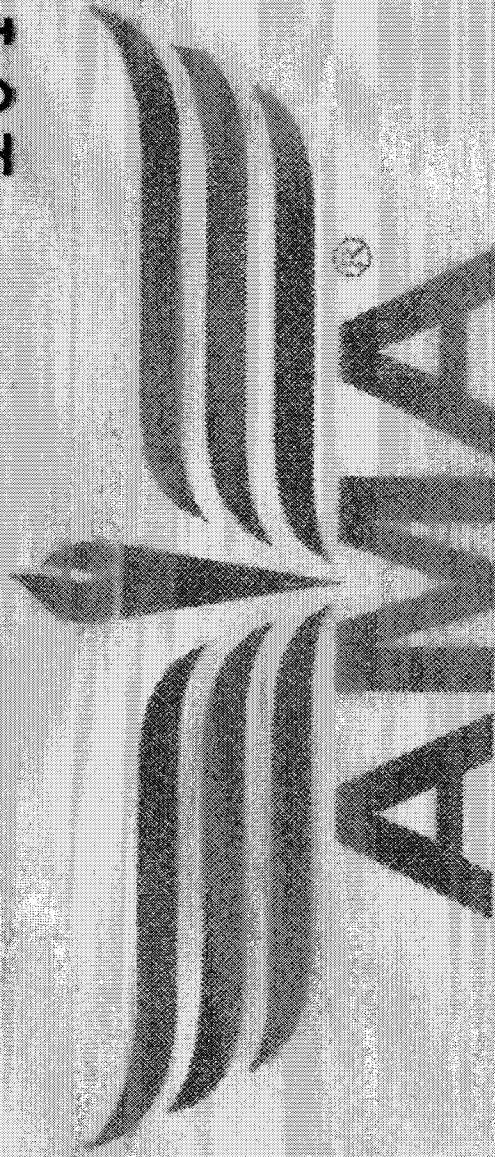
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ACADEMY OF MODEL AERONAUTICS
2014 MEMBER

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Spreading Wings S800 EVO

User Manual

V 1.10

February 07, 2014 Revision

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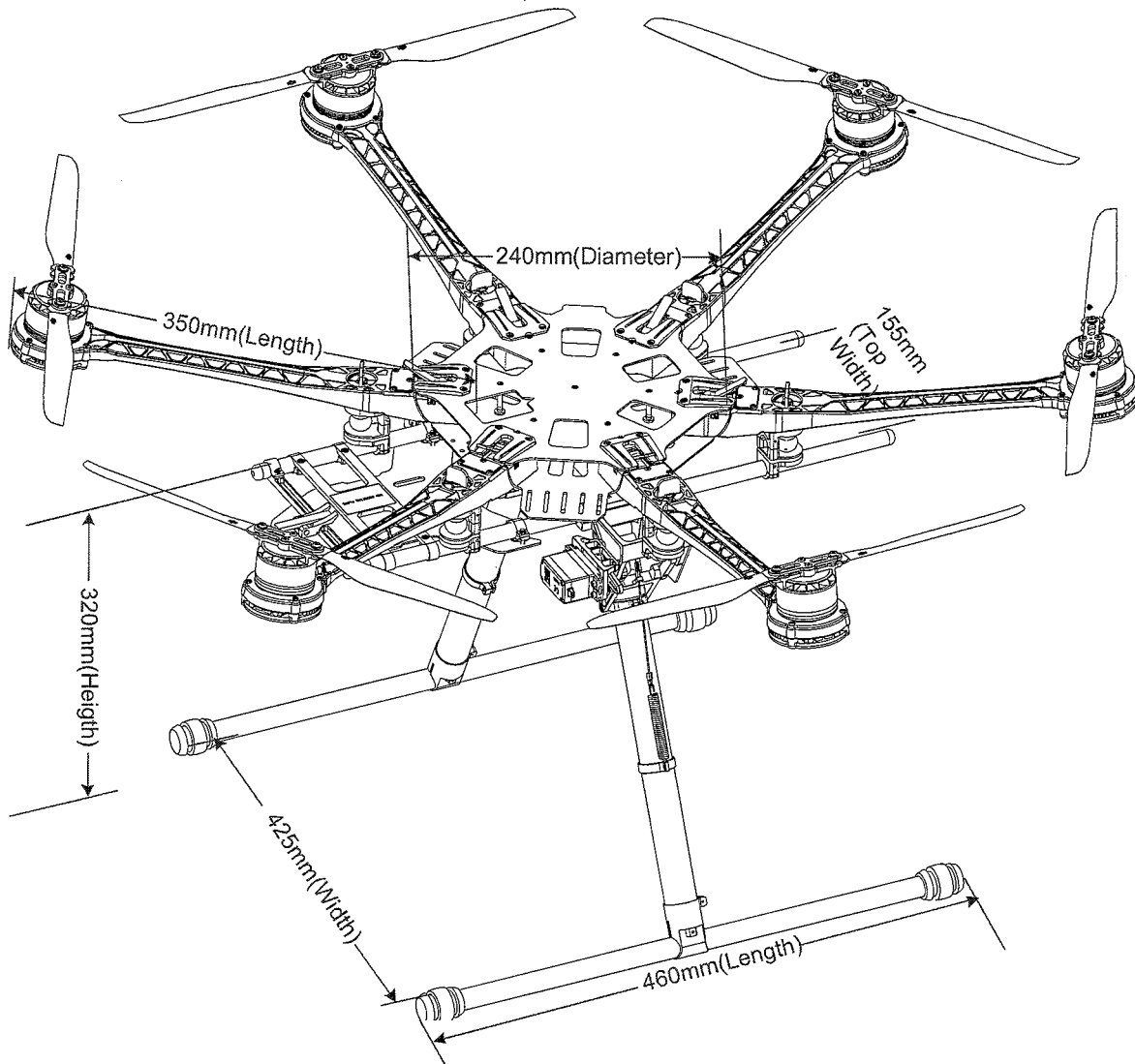
Thank you for purchasing this DJI product. Please regularly visit the S800 EVO web page at www.dji.com, which is updated regularly. Product information, technical updates and manual corrections will be available on this web page. Due to unforeseen changes or product upgrades, the information contained in the manual is subject to change without notice.

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Profile

S800 EVO is a multi-rotor designed for aerial photograph which integrates reinforced mechanical structures, stabilized dynamical system and high-efficiency power supply. Integrated designs make assembly and configuration become especially easy and fast; retractable landing gear, foldable propellers and collapsible GPS Mount are conveniently portable for optimal user experiences. Retractable landing gears and vibration dampers coordinate to create omnidirectional aerial view and high quality photograph. Combined with professional DJI multi-rotor autopilot system S800 EVO will achieve hovering, cruising and other steady flight elements, which can be applied for aerial photography and other aero-modeling activities.





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Product Usage Cautions

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

Assembly Cautions

- (1) Mount the GPS Module with a bracket, to avoid interference with the power board of center frame.
- (2) For IMU mounting, make sure the arrow direction marking on the IMU is pointing to the aircraft nose.
- (3) The receiver is strongly recommended to be attached under the bottom board of center frame, and the head of antenna is downward without any obstacle. Otherwise the aircraft may be out of control, since the wireless signal may be lost.
- (4) Mount the arms correctly.
 - a) Center frame  Arm
 - b) Center frame  Arm
- (5) For removing screws in the bottom board, please proceed with cautious, avoiding damages. Do not remove any other screws fixed with glue.
- (6) Notice matching the indications is very important, please pay attention to them.

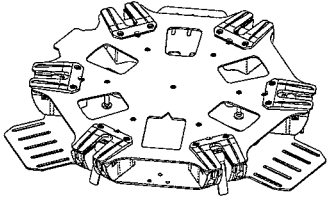
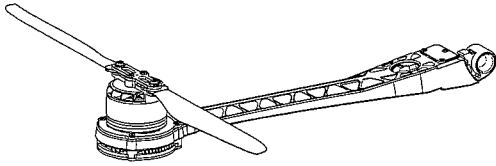
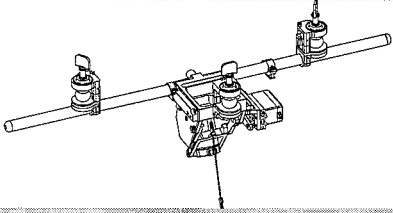





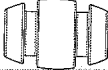
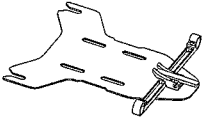
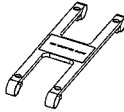
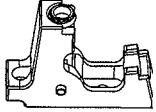
Flight Cautions

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

Others

- (1) If you have any problem you cannot solve, please contact your dealer or DJI customer service.

In The Box

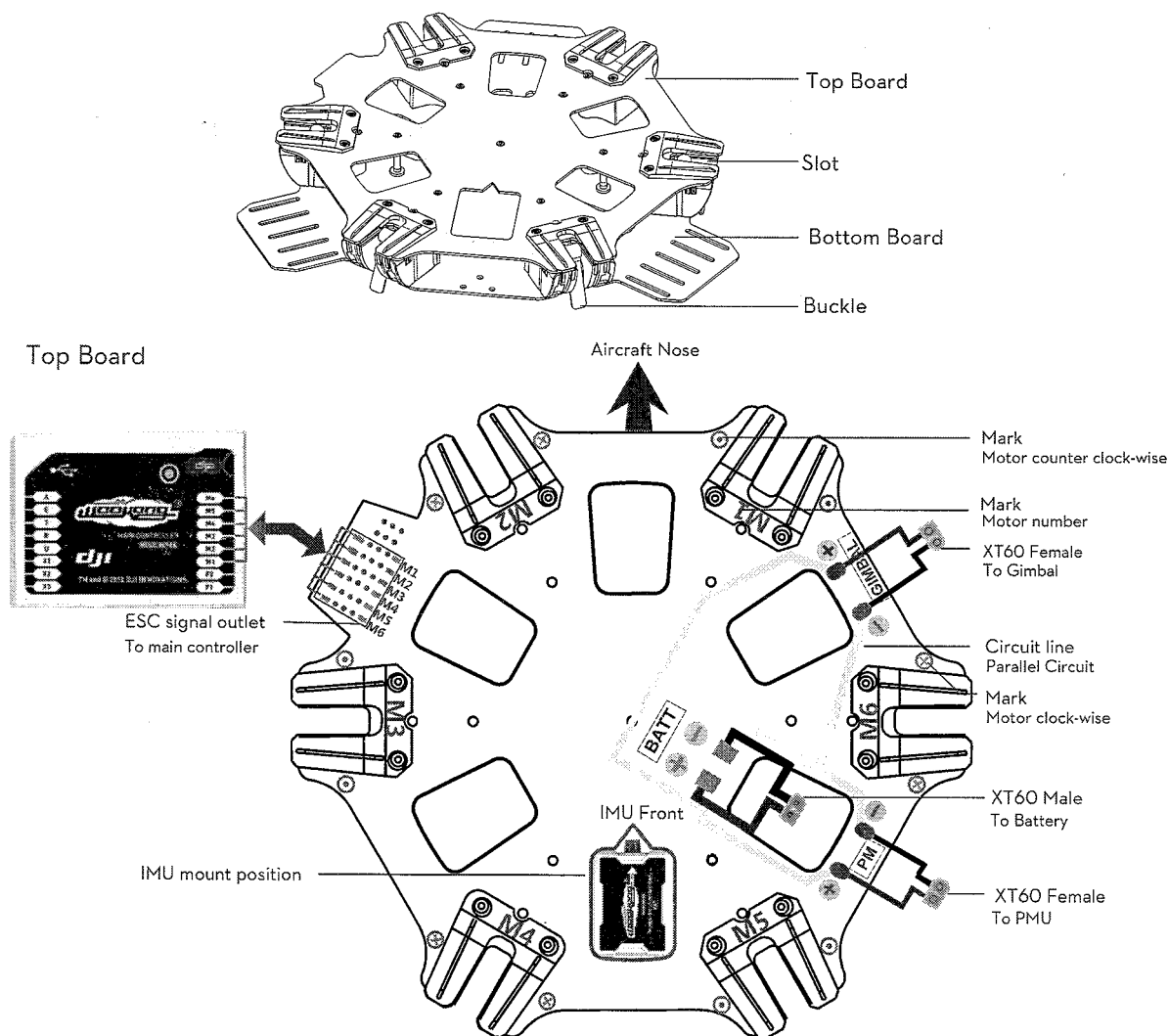
Center Frame×1	Frame Arm×6
	
Retracting Mechanism×2	Landing Gear Support Tube ×2
	
Base Pipe×2	H Frame Connection Pipe×1, Spring×2
	 
Package of 3-PIN Servo Cable ×1	Silicone Rubber Damper ×4
	
Package of Battery Tray×1	Package of IMU Mount×1
	
GPS Fixed Seat×1	Screw Package for Frame×1 Screw Package for Landing Gear×1
	
Out of The Box Guidance ×2	

Tools Needed

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

The top board is a power distribution board, and the bottom board is for loading autopilot system components.



Notes:

- (1) For IMU mounting, make sure the arrow direction marking on the IMU is pointing to the aircraft nose.
- (2) Connect the 3-pin connectors (M1-M6) of servo cable from WKM M.C. to ESC signal socket (M1-M6) on center frame markings accordingly.

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

Tips:

- (1) The main battery power leads, gimbal and PMU leads are on the bottom surface of the top board.
- (2) Markings ⚙ and ⚙ stand for the propeller rotation direction. ⚙ means clock-wise, and ⚙ means counter clock-wise.
- (3) If other lead connector is required, please cut the original connector and solder on the new one. (But NOT Recommend.)

Attach Electric Equipment to Center Frame

1. (Fig.1) Remove the screws in the bottom board.
2. (Fig.2) Attach the IMU module into IMU position in the center frame. Ensure the IMU casing is out of touching the top board edge, as vibration can cause IMU mal-function.
3. (Fig.2) Please attach DJI Autopilot System parts onto the bottom board (not including GPS modules).
4. (Fig.2) Connect the Autopilot System and receiver. Please refer to DJI WKM User Manual for details.
5. (Fig.3) Please fix all the screws to bottom board, and use adequate thread locker.
6. (Fig.4) Attach the GPS Fixed Seat to the top board (near to the M3), then mount the GPS Module to the GPS Fixed Seat with a bracket.
7. Configure Autopilot System. Please refer to DJI WKM User Manual.

Note:

- (1) Make sure to mount the IMU module at the IMU position first, and the mount orientation is correct.
- (2) Mount the GPS with a bracket, to avoid interference from center frame power board.
- (3) Make sure the USB port of the M.C. is pointing outwards for easy access.
- (4) Please wire neatly. Make sure the wires will not be cut by the edge of frames.
- (5) Install the screws with appropriate strength to prevent damage threads.
- (6) Watch out clamping fingers when folding the GPS Bracket.

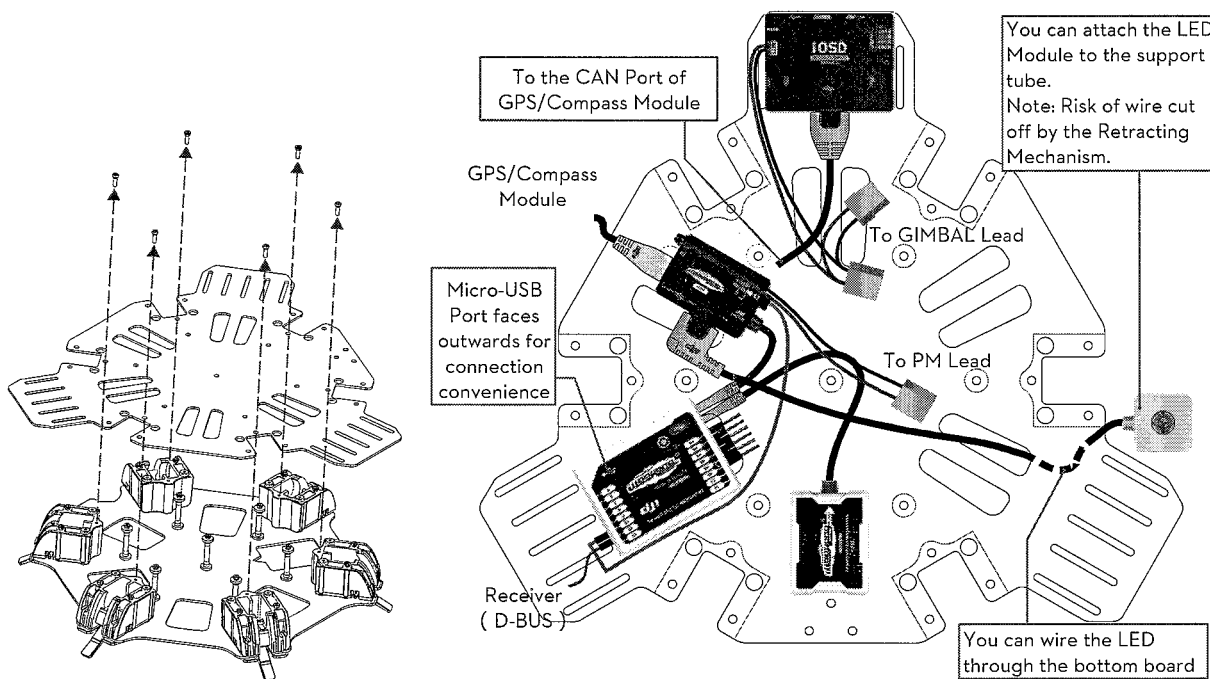


Fig.1 Remove the screws

Fig.2 Attach the Autopilot System

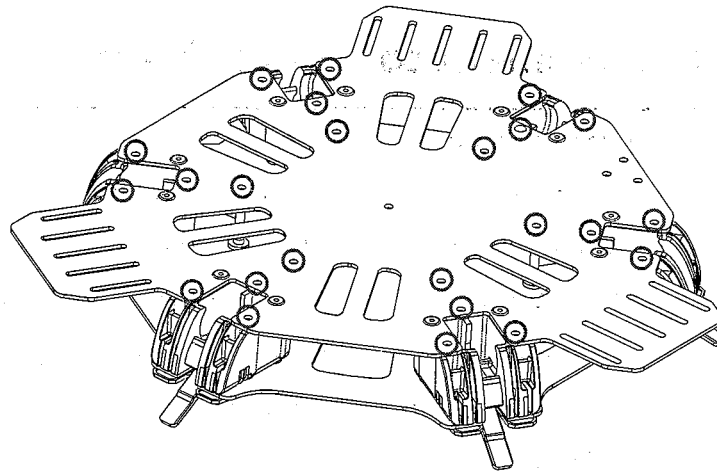


Fig.3 Fix the screws

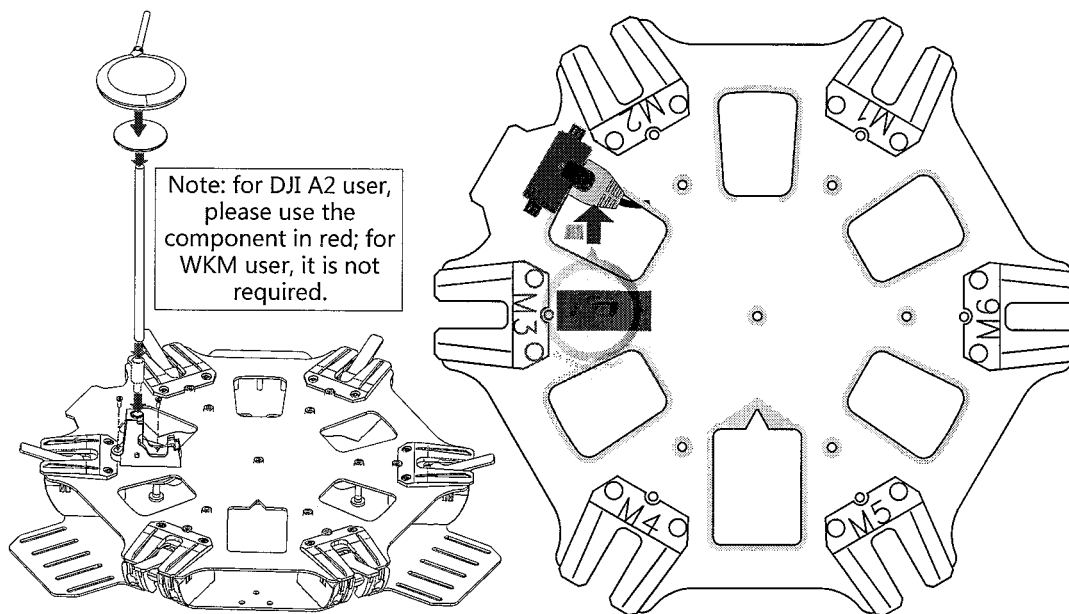


Fig.4 Mount the GPS Fixed Seat and GPS module

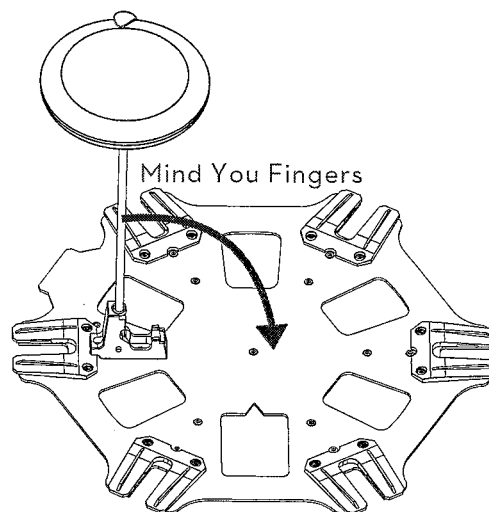
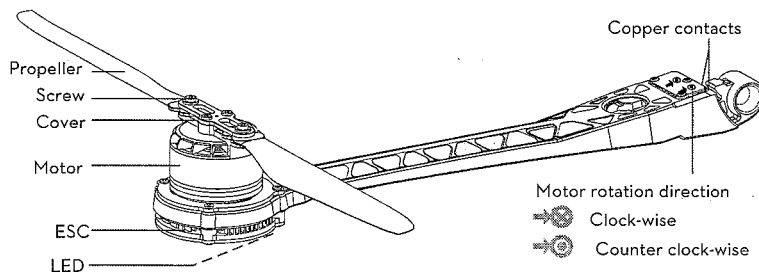


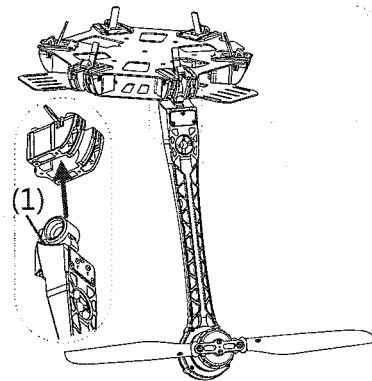
Fig.5 Note of folding the GPS Bracket

Mount Frame Arms

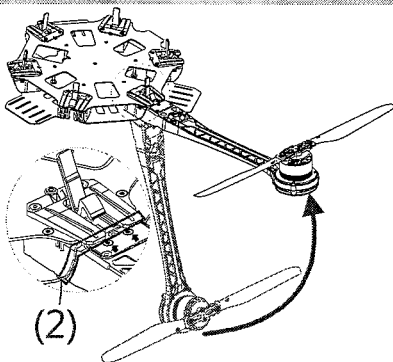
Step 1



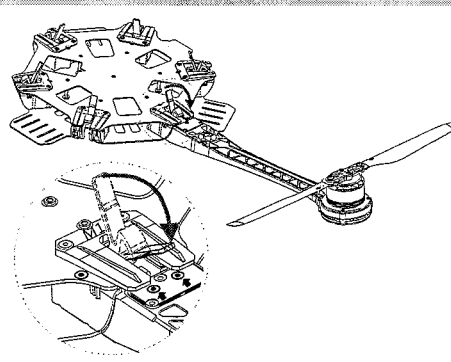
Step 2



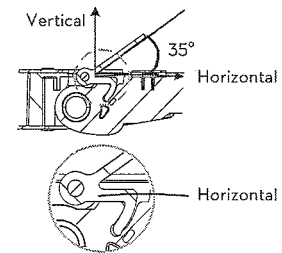
Step 3



Step 4



Step 5



Step1: Check the arms.

- (1) Make sure the copper contacts are in good condition without bend or severe wear.
- (2) Make sure the propellers are without crack, and screws in propeller cover tight.
- (3) Make sure the motors are mounted firmly, and rotate freely.
- (4) We recommend you to mount the arms with red propeller cover to M1 and M2 to indicate the nose of aircraft.
- (5) Distinguish the marks and on the arms.
 - Arm ↔ Center frame
 - Arm ↔ Center frame

Step2: Insert the frame arm into center frame vertically.

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.

Notes:

- (1) Please add some lubricant at the position (1) if it is hard to press down the buckle.
- (2) Slowly rotate the frame arm to prevent from breaking the copper contacts.

(3) Please refer to (2) to make sure the arm is perfectly positioned.

(4) Make sure to use appropriate strength to press down the buckle correctly.

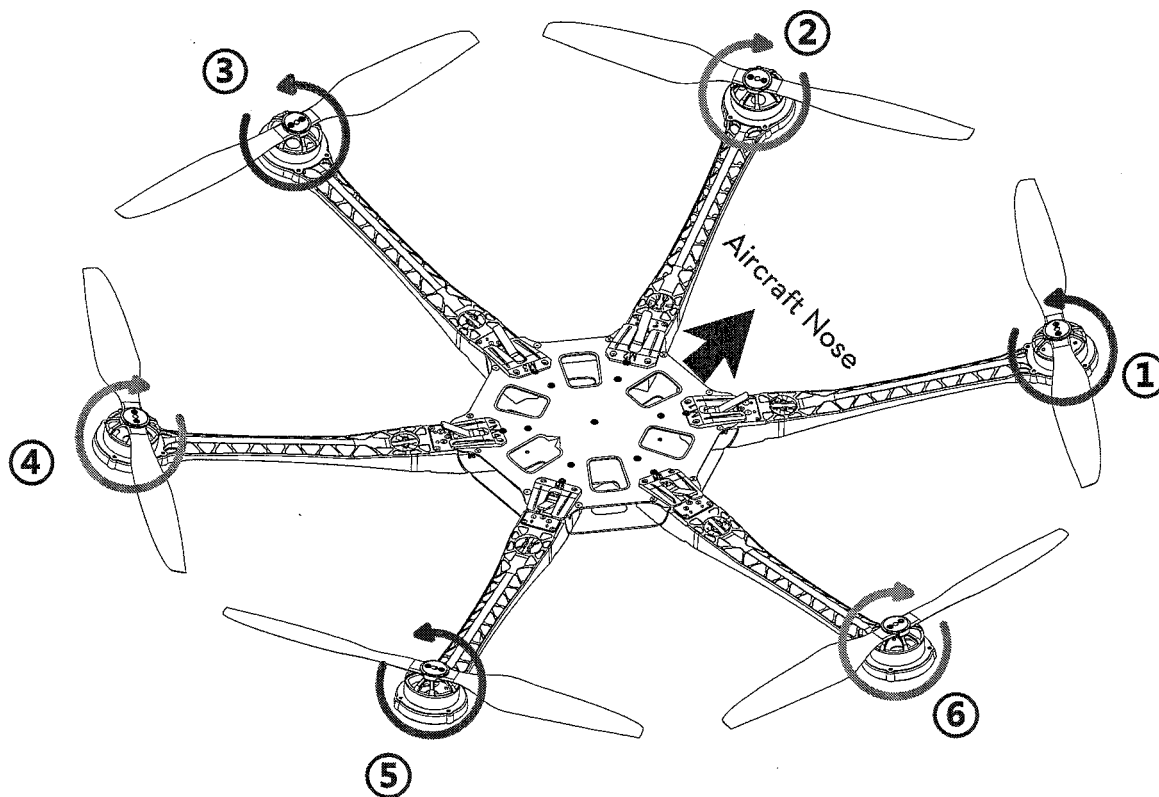
(5) Do not hot plug arms.

Tips:

(1) LED is on after motor start.

Step 6 Double Check

Arms①② are aircraft nose, arms④⑤ are aircraft tail. See from top, motors on arms①③⑤ rotate counter clockwise; motors on arms②④⑥ rotate clockwise.

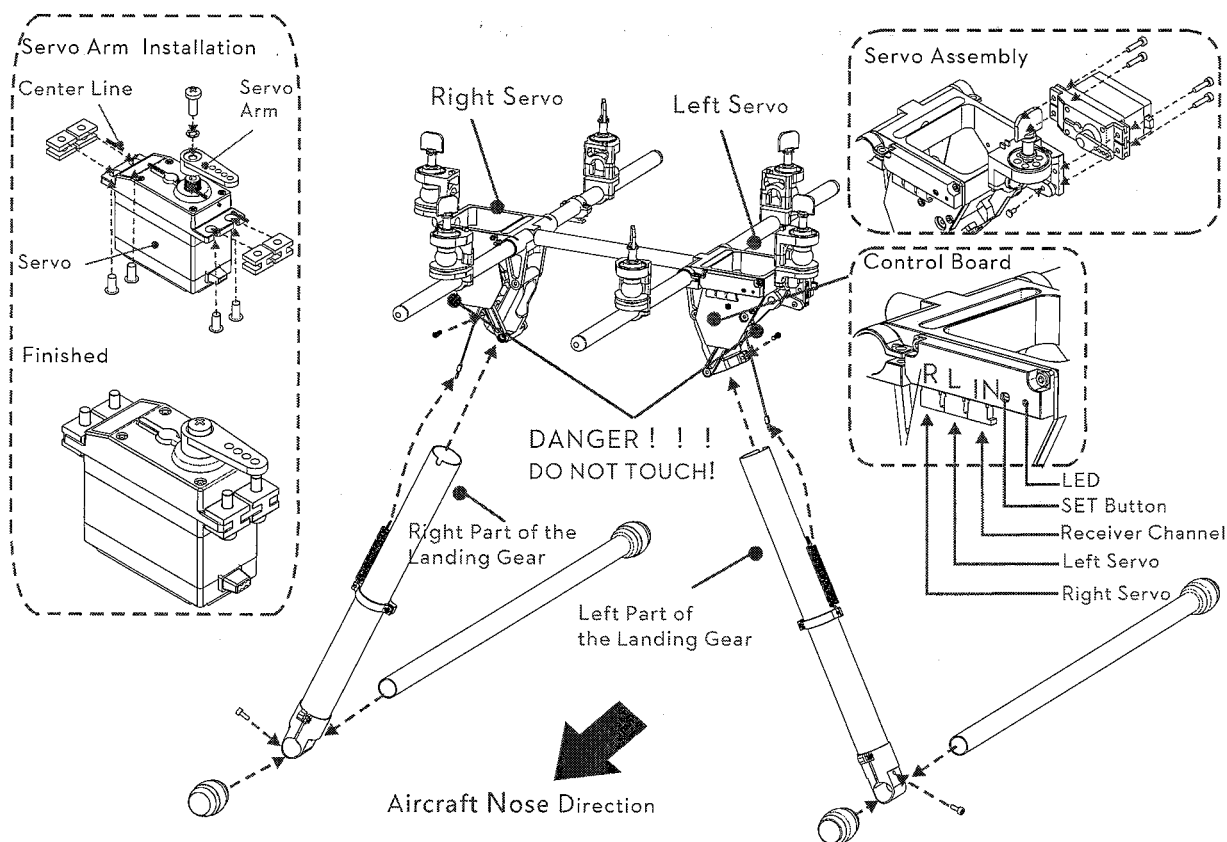


Mount Landing Gear

By using a 2-position switch of R/C transmitter, you can control the landing gear to retract remotely.

1 Assembly & Connection

The part with the control board attached is defined as left, and the other part is right. Make sure to make a distinction between the left and the right servos.



step1: Servo Installation *(If the servos have already been installed, please skip this step.)*

1. (Shown in the Fig) Define and mark the two HS-7954SH servos from Hitec as left servo and right servo.
2. Connect the left servo to the [L] port on the control board, and the right servo to the [R] port.
3. Keep pressing the SET button with aid of a small tool, and then power on. You will see the yellow LED beside SET button flashes quickly, and then wait until the servos have finished their position initialization.
4. Make sure the servo arm is parallel to the servo's center line.
5. Power off, assemble the left and right servos to the left and the right parts of the landing gear.

Tips: If you use your own servos, it is recommended to use the dedicated programmer from Hitec to enlarge the servo travel from 120° to 150°, and then install servos by the above steps. Servos from DJI have been enlarged servo travel.

step2: Mechanical Assembly

1. Assemble the left and right parts respectively, and then fix the screws at the joints with appropriate thread locker.
2. Connect the left and right parts with connecting rod.
3. For safety reasons, make sure to connect the springs to both parts.

step3: Electrical Connections

1. Plug the cables from the servos into the correct ports on the control board. Make sure the right servo is connected to the **[R]** port, and the left servo to the **[L]** port.
2. Connect the required 2-position switch of R/C receiver to the **[IN]** port.

2 Travel Calibration

If the Landing Gear you got has been installed with the servos, please skip this step. Otherwise, calibrate the system using the following procedures.

1. For safety reasons, please keep your hands away from any link mechanism to avoid injury.
2. Make sure the **[R]**, **[L]** and **[IN]** connections are correct and firmly connected.
3. Hang the Landing Gear in the air during calibration, as the landing gear will move.
4. Keep pressing the SET button using a small tool and power on. You can see the LED flashes YELLOW quickly, and then press the SET button once again. The system begins auto calibration with the indication of the LED flashing YELLOW slowly. **DO NOT** obstruct any moving part during auto calibration.
5. The left-part is calibrated, the left link mechanism first moves up then moves down automatically. Then the right-part is calibrated, the right link mechanism first moves up then moves down automatically.
6. After calibration, both left and right parts are in the **[Lower]** position, and the LED is solid GREEN on. Then the landing gear will work normally.

Notes:

- (1) If the LED is solid YELLOW on during calibrating, it means that there is something wrong with the calibration, please re-do the Servo Installation of the Assembly & Connection section, since the servo arm might be installed with a wrong angle.
- (2) Please avoid any obstruction during calibrating. If the landing gear is blocked from moving, please recalibrate the landing gear by the above steps.
- (3) If the **[R]** and **[L]** servo cables are reversed, the travel will not be measured correctly. Please connect correctly and recalibrate the landing gear using the above steps.

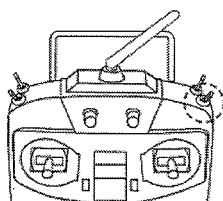
3 Transmitter Setting

Select a 2-position switch (default setting is OK) of

Transmitter as the control input of the landing gear, and

then make sure the corresponding port of receiver is

connected to the **[IN]** port on control board.



Retracted : Toggle the switch to this position to retract the landing gear (Fig.1)



Lower : Toggle the switch to this position to lower the landing gear (Fig. 2)

Tips:

- (1) If the switch of Transmitter has FailSafe function, set the FailSafe value to the **[Lower]** position, so that the landing gear will be in **[Lower]** status when the receiver enters FailSafe mode, to land the aircraft safely.
- (2) To avoid false switch triggering, you can use the slide lever or other trim as the landing gear's control switch.

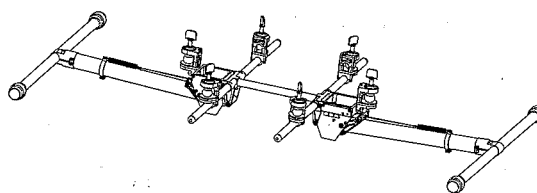


Fig. 1

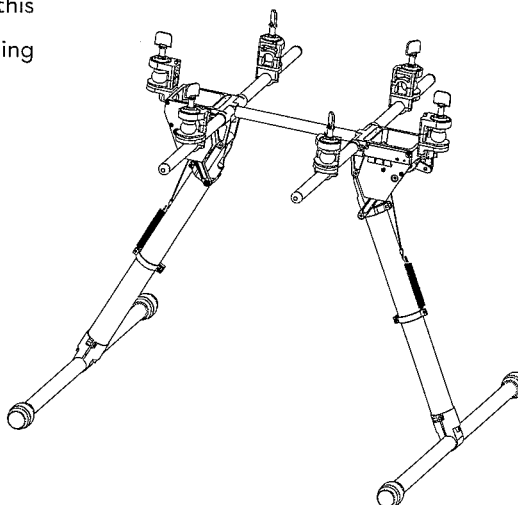


Fig. 2

4 Usage










The landing gear can be used by following the steps below after assembly & connection.

1. Make sure the transmitter & receiver batteries are fully charged.
2. Toggle the switch to the **[Lower]** position, and then turn on the transmitter.
3. Make sure the **[R]**, **[L]** and **[IN]** connections are correct and firmly connected.
4. Make sure the Landing Gear is at the **[Lower]** position, and then power on the system. If the green LED is solid on, then this is a normal start. If the LED flashes GREEN slowly, please re-calibrate the system according to the procedure of Travel Calibration.
5. Make sure to toggle the switch to the **[Retracted]** position ONLY AFTER you takeoff the aircraft.
6. When the aircraft is landing, please toggle the switch to the **[Lower]** position for a safe landing.

Tips

- (1) The system will turn off the servo power temporarily within 3 seconds after the landing gear has reached the target position.
- (2) When powering on the system, if the Transmitter switch is at the **[Retracted]** position, which is the unsafe signal for the landing gear, the LED will quickly flash RED. Toggle the switch to the **[Lower]** position.
- (3) If there is an abnormal signal or no signal input into the **[IN]** port the LED will slowly flash RED. Please check the receiver and the connections.
- (4) If the power consumption of servos is too large during usage, the LED will be solid RED on. If this status lasts more than 4 seconds, the landing gear will lower and the LED will flash GREEN slowly. Please re-calibrate the system.

LED Indicator

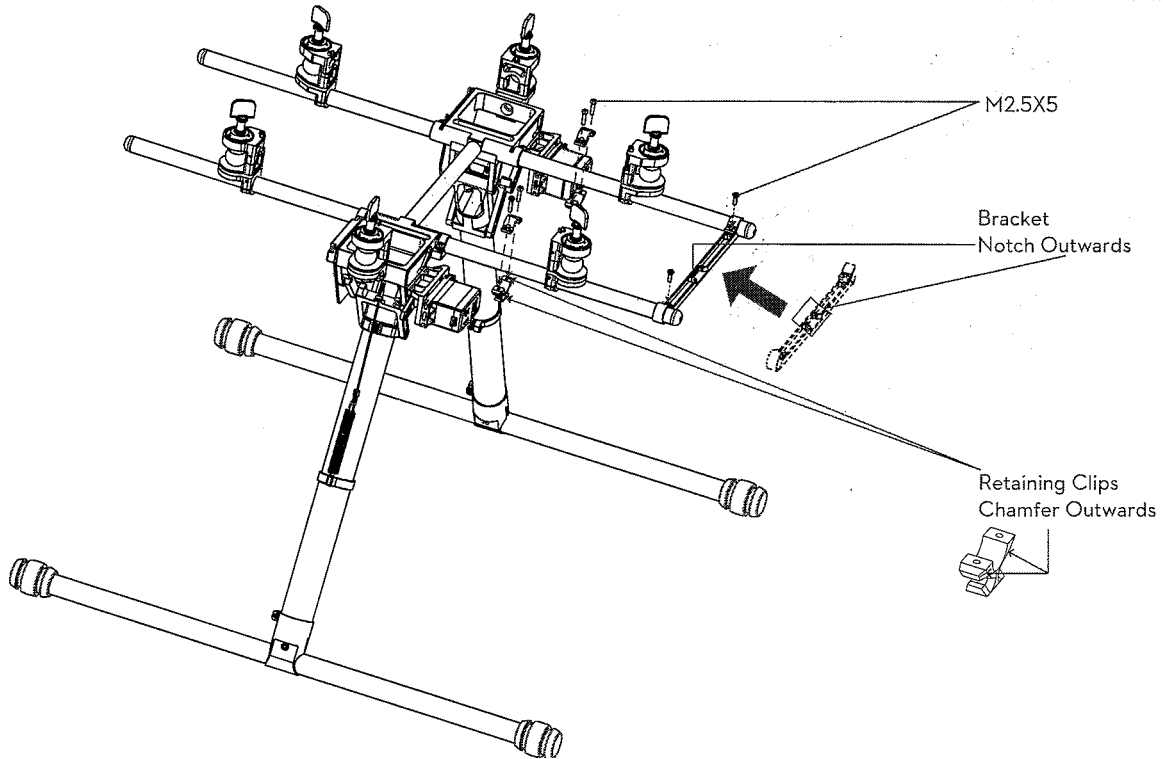
System works normally	
Hasn't been calibrated	
Need re-calibration	
Wrong calibration	
Enter the calibration mode	
System is calibrating	
Motor stall	
Input signal is unsafe when power on the Transmitter	
Input signal is abnormal	

Specifications

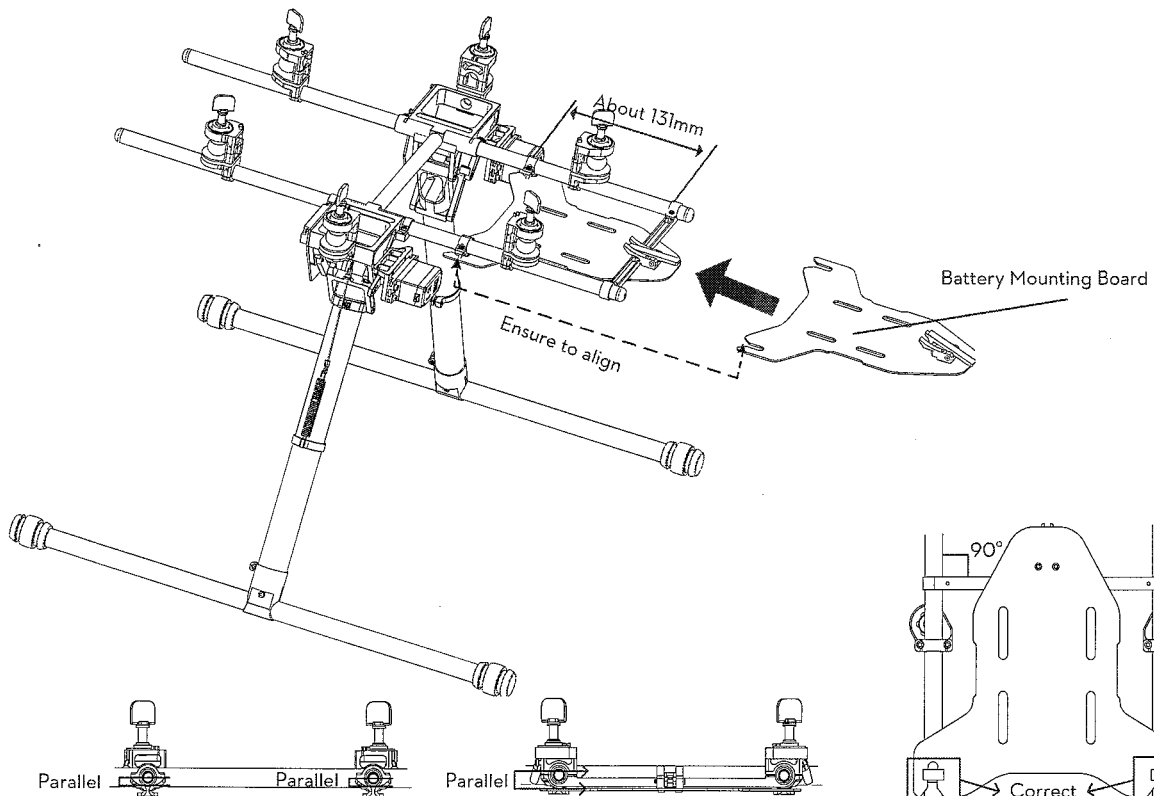
Parameter	Range	Parameter	Range
Working Voltage	3S-6S (LiPo)	Input Signal	PWM (High-Pulse Width 800us-2200us)
Working Current	Max 1A@6S	Output Signal	PWM(Mid Position is 1520us) in 90Hz
Working Temperature	-20-70°C	Output Voltage	6V
Total Weight	875g	Servo Travel	150° (Minimum 120°)

5 Mount Battery Bracket

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

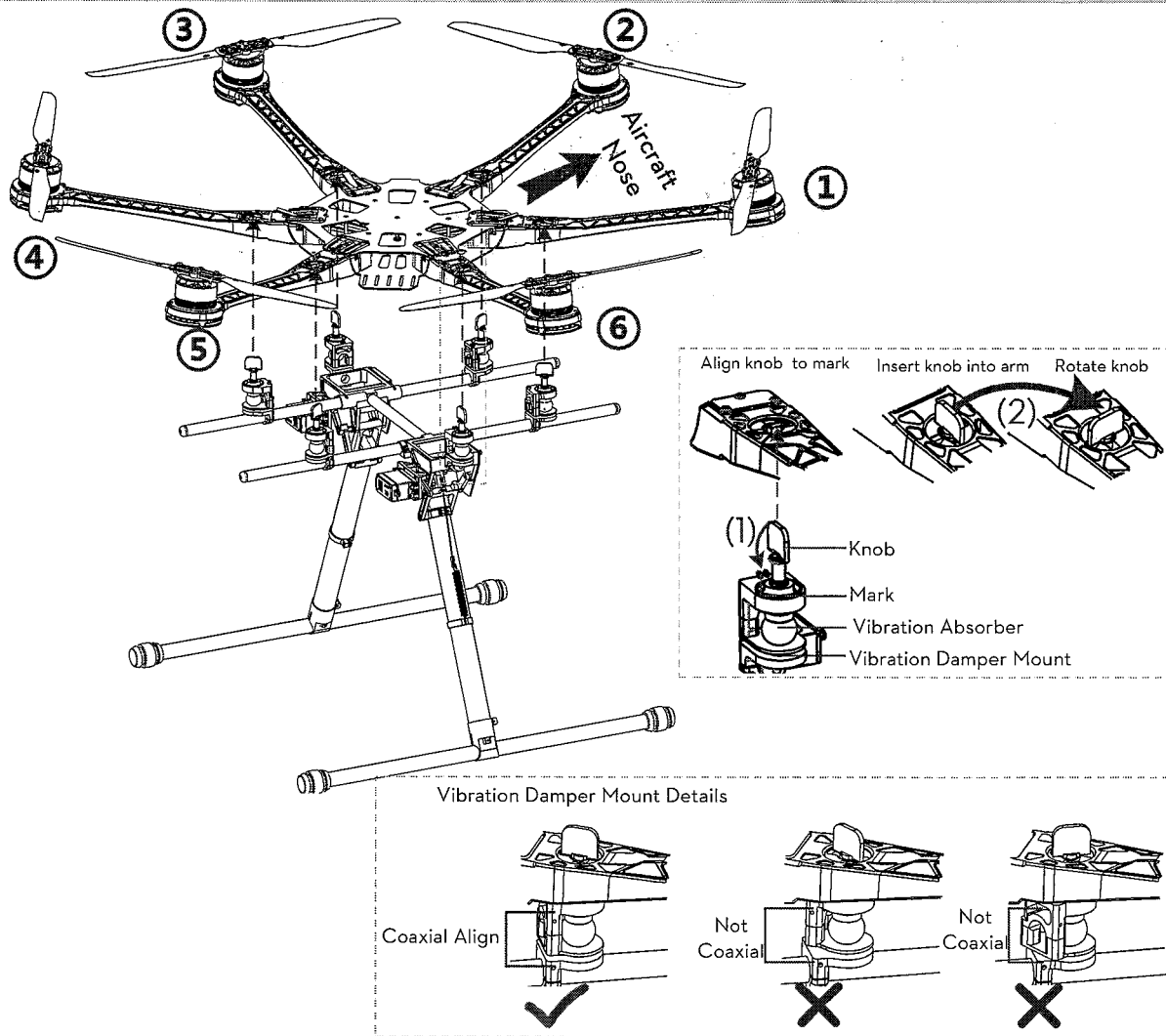


Step2: Place the battery mounting board and adjust its position, and then tighten all screws.



Assembly

Assembly



1. Align all knobs on H frame to the marks; refer to fig (1).
2. Lie frame and Landing Gear horizontally, insert knobs into arms ③ and ⑥ first, and then adjust to insert the others into the arms.
3. Make sure the Vibration Damper Mount is correct, and then rotate the knob to the end, as fig (2) shown.

Notes:

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

Install the IMU Mount (Optional)

If you wish to achieve a smooth and steady flight, carry out the following procedures to install the IMU Mount.

1. (Fig.1) Remove the screws to dismount the Battery Bracket.
2. (Fig.2) Fix the IMU Mount and remount the Battery Bracket.
3. (Fig.3) Adjust the IMU Mount and the Battery Bracket, and then fix all the screws.
4. (Fig.4) Attach the IMU Module; make sure that the arrow on LOGO is pointing to the aircraft nose.

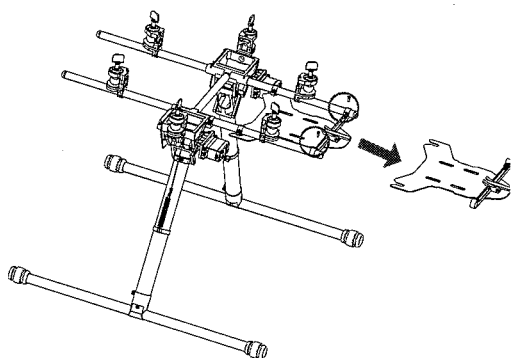


Fig.1

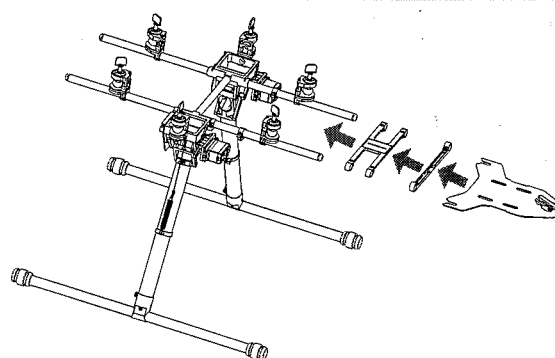


Fig.2

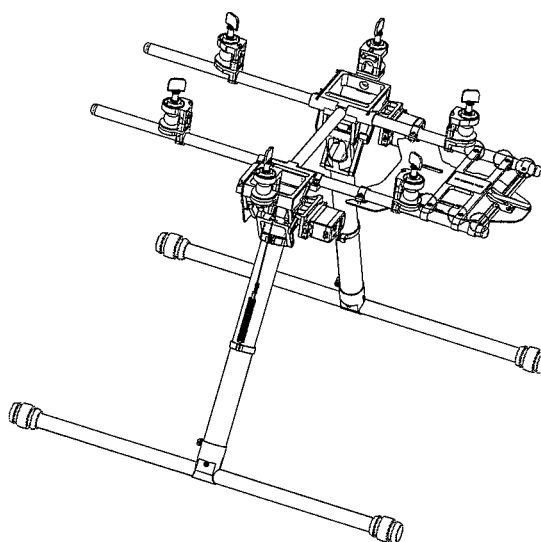


Fig.3

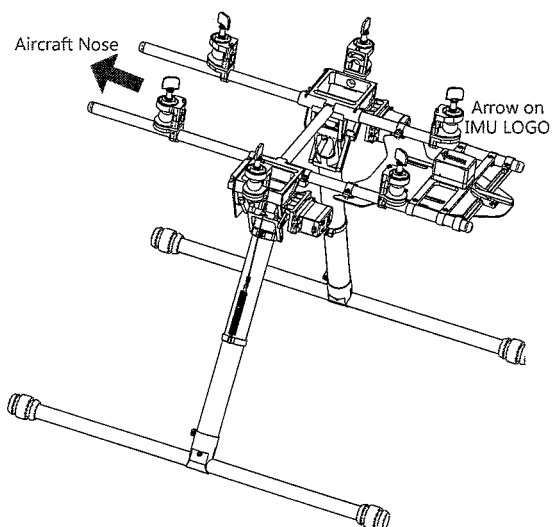


Fig.4

Appendix

ESC Sound

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

ESC LED

ESC State	LED
Standby	Off
Motor rotating	Solid Red or Green On
Motor rotating at full throttle position	Solid Yellow On

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

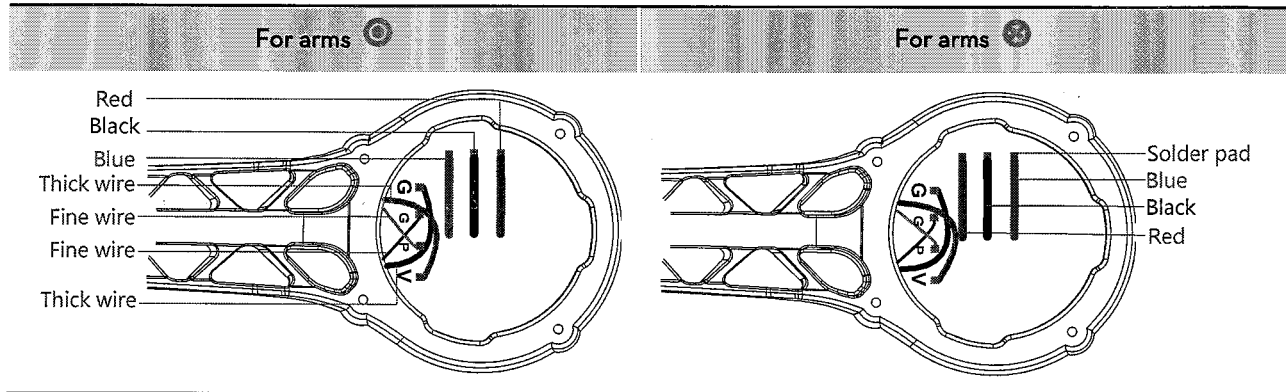
Frame	
Diagonal Wheelbase	800mm
Frame Arm Length	350mm
Frame Arm Weight (with Motor, ESC, Propeller)	356g
Center Frame Diameter	240mm
Center Frame Weight	550g
Landing Gear Size	460mm(Length)×425mm(Width)×320mm(Height) (Top width: 155mm)
Retractable Landing Gear Weight (Including Battery Tray)	1050g
Motor	
Stator Size	41×14mm
KV	400rpm/V
Max Power	500W
Weight (with Cooling Fan)	158g
ESC	
Current	40A OPTO
Voltage	6S LiPo
Signal Frequency	30Hz ~ 450Hz
Drive PWM Frequency	8KHz
Weight (with Radiators)	35g
Foldable Propeller (1552)	
Material	Engineering plastic
Size	15×5.2 inch
Weight	13g
Flight Parameters	
Takeoff Weight	6.0Kg ~ 8.0Kg
Total Weight	3.7Kg
Power Battery	LiPo (6S, 10000mAh~15000mAh, 15C(Min))
Max Power Consumption	3000W
Hover Power Consumption	800W(@ Takeoff Weight 6.7Kg)
Hover Time	Max: 20 min (@15000mAh&6.7KgTakeoff Weight)
Working Environment Temperature	-10 ~ +40 °C

FAQ (Trouble Shooting)

Solder ESC

Make sure to solder the 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.

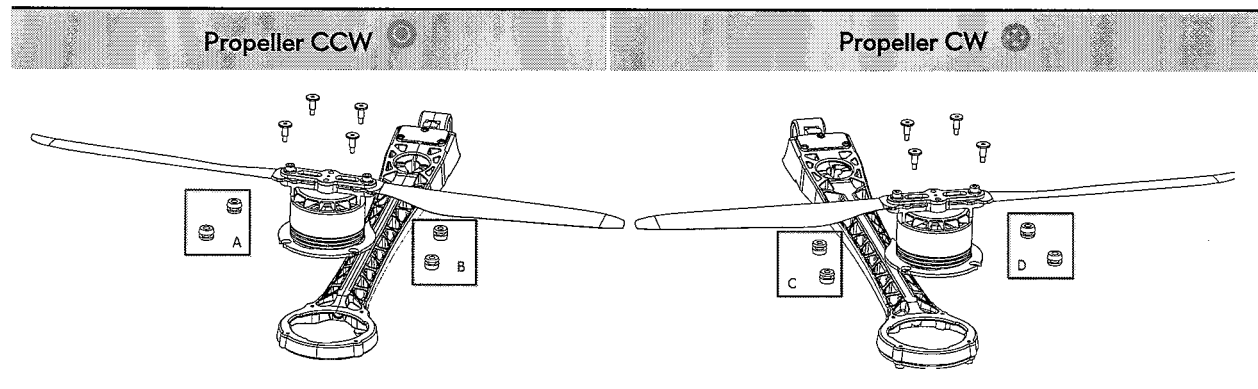


Assemble the Vibration Absorber of Motors

The soft gasket is a part of the Vibration Absorber and it has a thick end and a thin end, it's important to assemble the soft gaskets in correct approach adhere to the diagram below.

Propeller CCW: the thick ends of the gaskets (A) are upwards, the thick ends of the gaskets (B) are downwards.

Propeller CW: the thick ends of the gaskets (C) are downwards, the thick ends of the gaskets (D) are upwards.

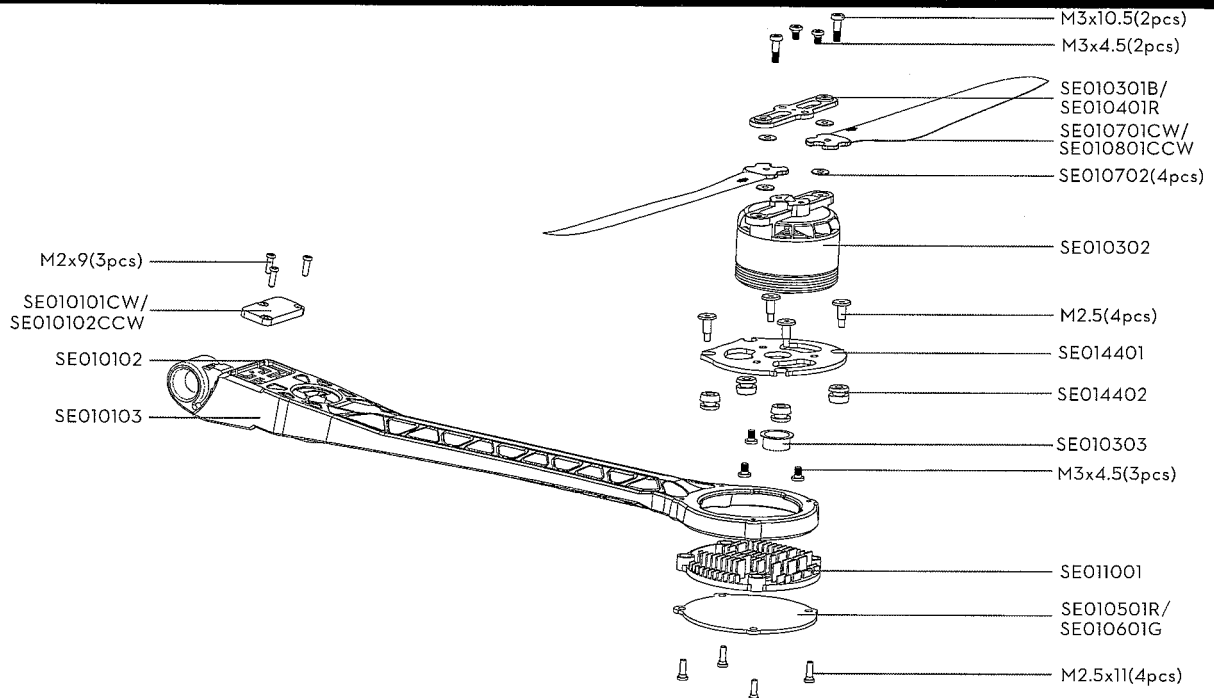


Spare Parts Listing

If S800 EVO needs component replaced, please refer to the following diagram to identify the component NO., and then make a purchase of corresponding package. Each package includes screws needed. The Components Number is defined as bellow.

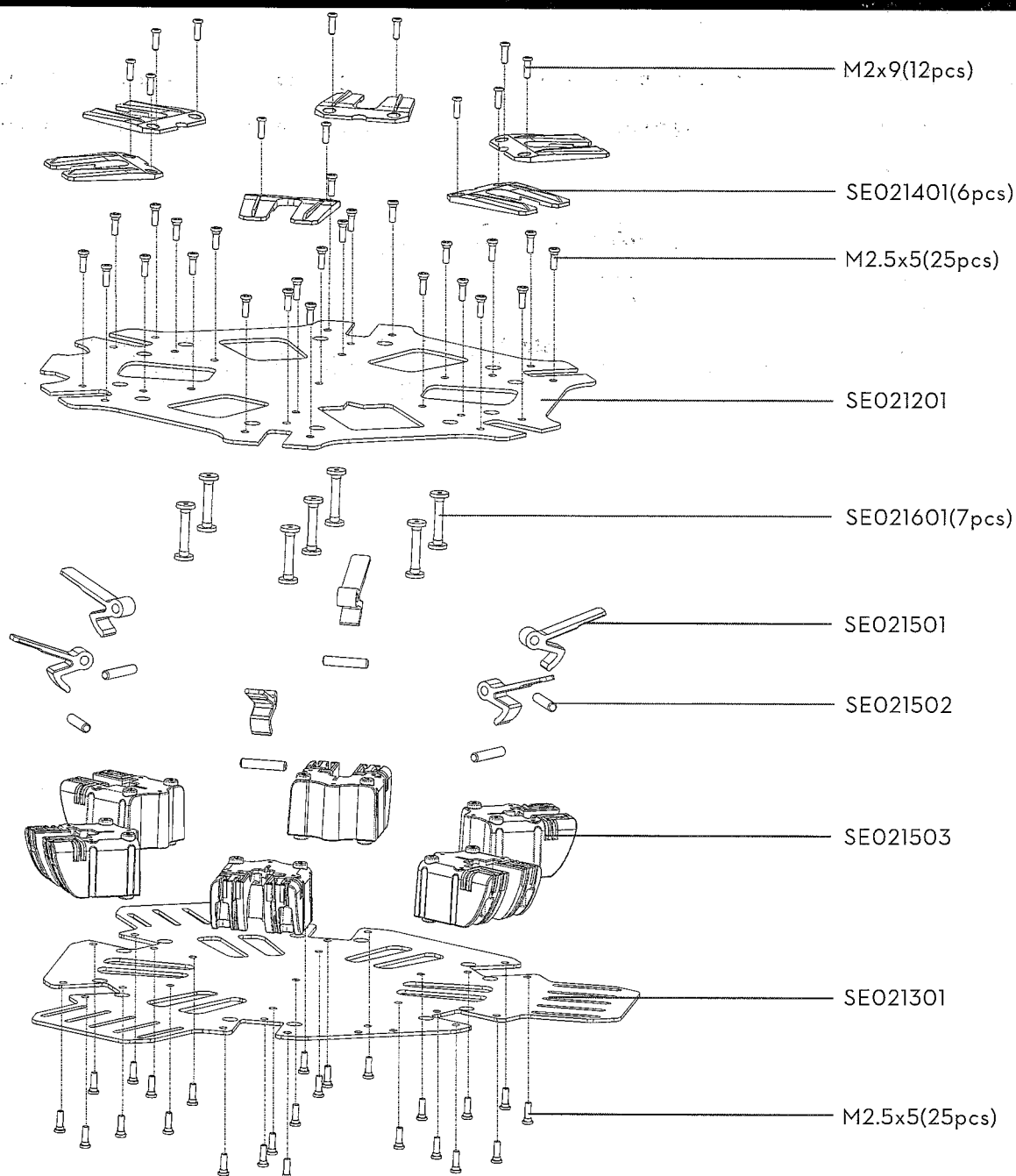
S800 EVO SE010101CCW CW-Clockwise ; CCW-Counter clockwise ;
 01Arm Frame ; 02Center Frame ; B-Black ; R-Red ; G-Green
 03Landing Gear Package NO. Parts NO.

Frame Arm



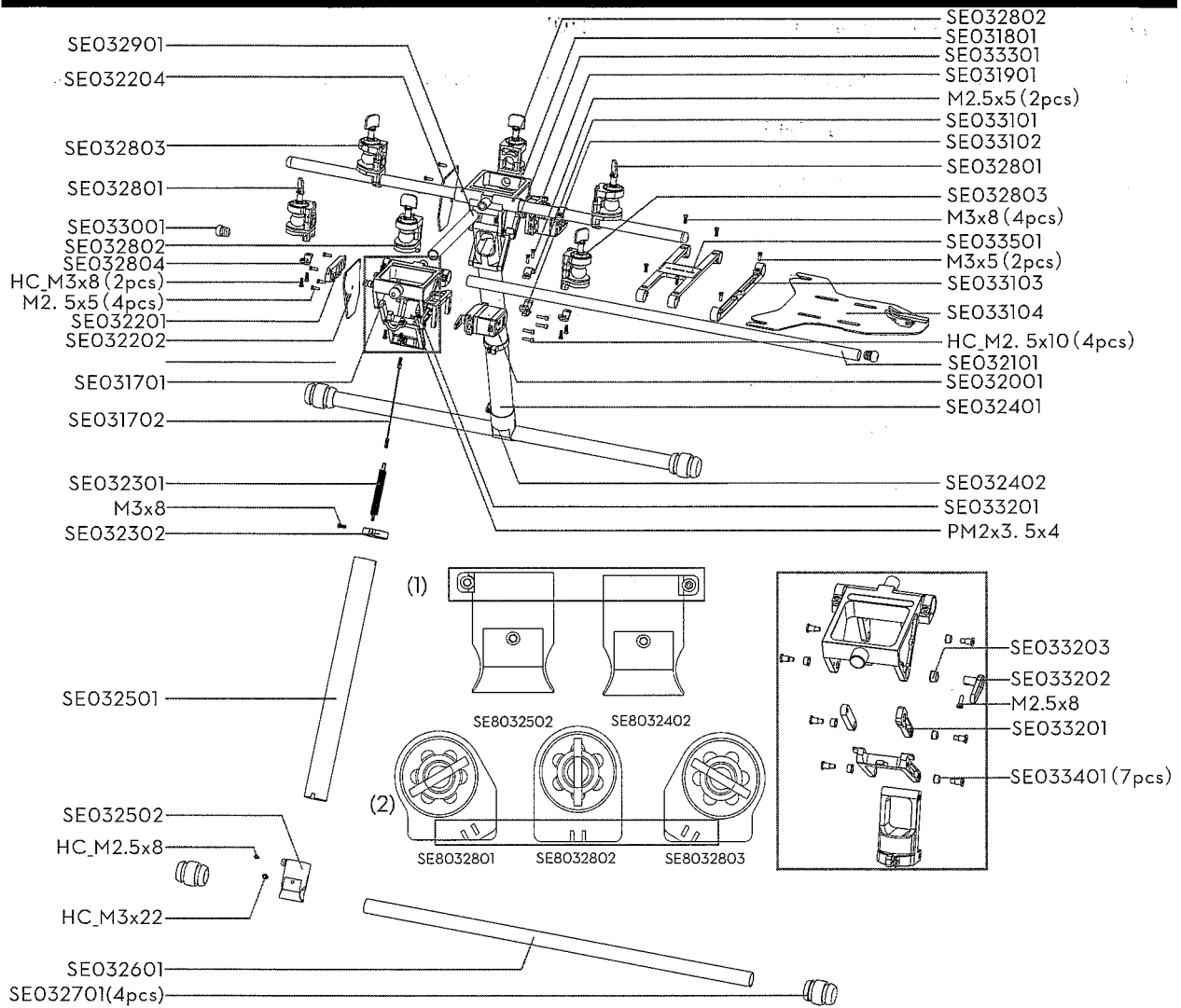
Package NO.	Name	Components Number
1	Frame Arm (Counter Clockwise)	SE010101CCW, SE010102, SE010103, M2x9
2	Frame Arm (Clockwise)	SE010102CW, SE010102, SE010103, M2x9
3	Motor with black Prop cover	SE010301B, SE010302, SE014402, SE014401 , SE010303 , M2.5x5, M3x4.5
4	Motor with red Prop cover	SE010401R, SE010302, SE014402, SE014401 , SE010303 , M2.5x5, M3x4.5
5	ESC with Red Led	SE010501R
6	ESC with Green Led	SE010601G
45	1552 Folding Propellers(both CW&CCW)	SE010701CCW, SE010801CW, SE010702, M3x10.5
9	Washer for Propeller	SE010702
10	ESC Heat Sink	SE011001

Center Frame



Package NO.	Name	Components Number
11	Center Frame	SE021201, SE021301, SE021401, SE021501, SE021502 , SE021503, SE021601, M2x9, M2.5x5
12	Center Frame Top Board	SE021201, M2x9, M2.5x5
13	Center Frame Bottom Board	SE021301, M2.5x5
14	Top Board Cover	SE021401, M2x9
15	Arm Mounting Bracket	SE021501, SE021502, SE021503, M2x9, M2.5x5
16	Aluminum Brace for Center Frame	SE021601, M2.5x5

Landing Gear

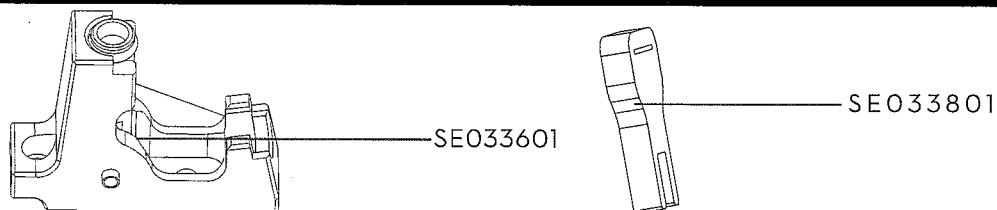


Note: (1) Left Support Tube right Support Tube are different; (2) Left set, middle set and right set of Damping Unit are different.

Package NO.	Name	Components Number
17	Retract Module(Left)	SE031701、SE031702
18	Retract Module(Right)	SE031801、SE031702
19	HITEC Servo (Right)	SE031901、HC_M2.5x10
20	HITEC Servo (Left)	SE032001、HC_M2.5x10
21	Carbon Tube of H-Frame	SE032101、HC_M2.5x8
22	Control Board	SE032201、SE032202、SE032203、SE032204、M2.5x5
23	Spring	SE032301、SE032302、SE031702、M3x8
24	Support Tube (Right)	SE032401、SE032402、M3x8、HC_M2.5x8、HC_M3x8
25	Support Tube (Left)	SE032501、SE032502、M3x8、HC_M2.5x8、HC_M3x8

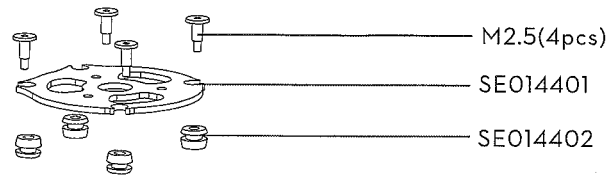
26	Base Tube	SE032601、SE032701
27	Silicone Rubber Damper	SE032701
28	Damping Unit (Set)	SE032801、SE032802、SE032803、SE032804、HC_M3x8
29	Aluminum Tube of H-Frame	SE032901
30	Silicone Rubber of H-Frame	SE033001
31	Battery Tray	SE033101、SE033102、SE033103、SE033104、M2.5x5、M3x5
32	Control arm of Retractable Module(Left)	SE033201、SE033202、SE033203、M2.5x8
33	Control Arm of Retractable Module(Right)	SE033301、SE033202、SE033203、M2.5x8
34	Shaft Sleeve of Retractable Module	SE033401
35	IMU Mount	SE033501、M3x8

Others



Package NO.	Name	Components Number
36	GPS Holder	SE033601
37	Screws Package	M3x8(10pcs)、HC_M2.5x10(10pcs)、M2.5x5(30pcs)、M2x9(10pcs)、M3x4.5(10pcs)、M2.5x8(5pcs)、M2.5x11(10pcs)、M3x 10.5(15pcs)、HC_M3x8(10pcs)、HC_M2.5x8(10pcs)、HC_M3x22(5pcs)
38	Blade Holder	SE033801

Package NO.	Name	Components Number
39	Battery Mount Board	SE033104、Velcro straps
40	Frame Arm with Prop CCW & Red LED	Package NO. 1、4、5、7、10
41	Frame Arm with Prop CW & Red LED	Package NO. 2、4、5、8、10
42	Frame Arm with Prop CCW & Green LED	Package NO. 1、3、6、7、10
43	Frame Arm with Prop CW & Green LED	Package NO. 2、3、6、8、10



Package NO.	Name	Components Number
44	Vibration absorber of Motor	SE014401、SE014402、M2.5